

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

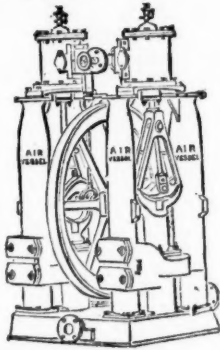
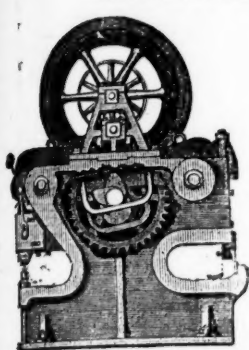
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No. 2150.—VOL. XLVI.

LONDON, SATURDAY, NOVEMBER 4, 1876.

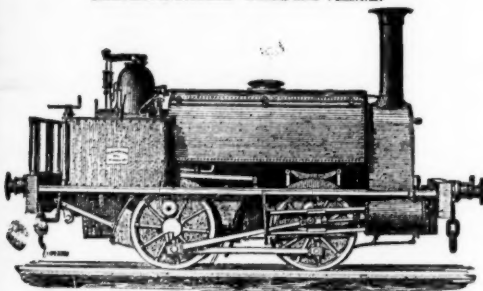
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PARIS,
BRONZE MEDAL, 1867.



ORDER OF THE CROWN OF PRUSSIA.



FALMOUTH,
SILVER MEDAL, 1867.

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Geographical Congress, Paris, 1875—M. Favre, Contractor, having
exhibited the McKean Drill alone as the MODEL BORING MACHINE
for the ST. GOTHARD TUNNEL.

SILVER MEDAL of the Highland and West of Scotland
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Are exclusively used, the advance made during eight consecu-
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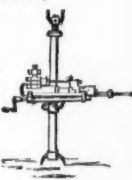
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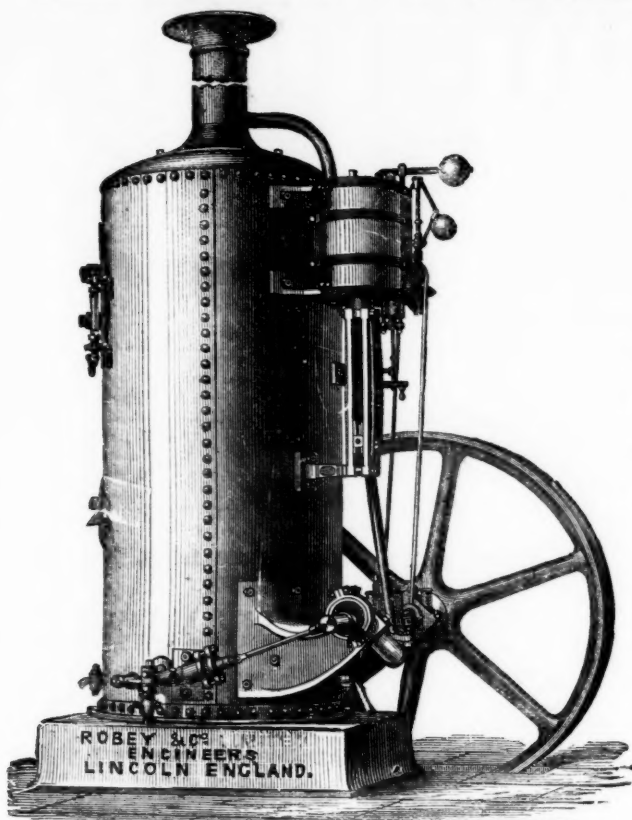
Patent No. 4136

Patent No. 4150

Dated 16th December, 1873.

Dated 17th December, 1873.

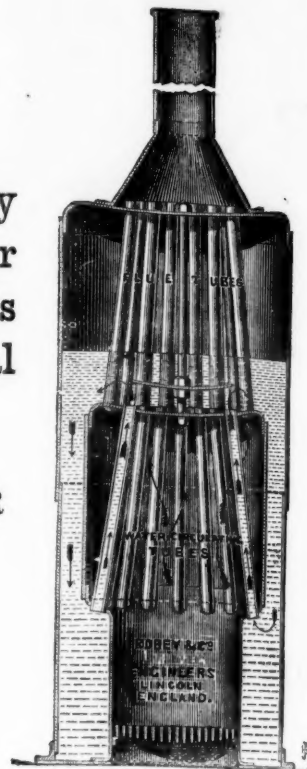
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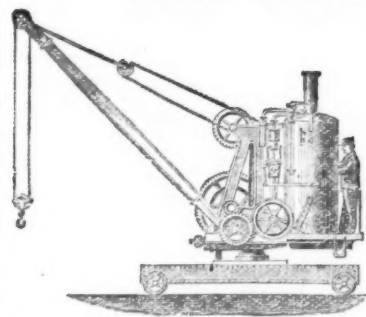
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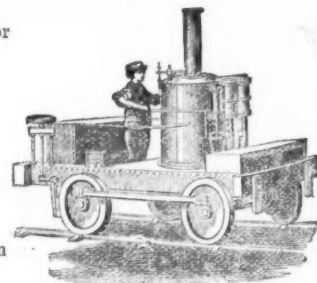
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Original Correspondence.

SUDDEN OUTBURSTS OF GAS IN COLLIERIES.

At the recent meeting of the Midland Institute of Mining Engineers, papers were read and discussed as to the cause of the sudden outbursts of gas in our mines. The subject was initiated by a paper with diagrams by the President—Mr. T. W. EMBLETON—on "Notes on the Oaks Colliery Explosion." This was followed at the last meeting by the reading of a paper by Mr. F. H. PEARCE, entitled "Remarks on Mr. Embleton's Diagram taken at the Oaks Colliery subsequent to the Sealing-up of the Shafts," the discussion on which is to take place at the gathering to be held in Leeds next week. The very great importance of the subject, and the ability with which it was handled by Professor GREEN and many of our leading engineers of the West Riding, that a summary of the proceedings must interest those connected with our collieries. It appears that when the shafts were sealed up a pipe was put through the scaffolding at the top, so that when there was any pressure of gas the valve was opened, and it was allowed to escape, so as to prevent its accumulation, for if such had not been done there might have been such a pressure as to materially damage the scaffold, and so entirely destroy what they wanted to do. Mr. PEARCE in his paper questioned whether all or any of the shafts were ever perfectly sealed up. On Tuesday, Oct. 1, 1867, when the pits were closed, the barometer stood at 29.9 in. = 406.6 of water-gauge. The water-gauge stood 1.3 in. during the next day; the barometer fell to 29.2 in. = 397.1 in. of water-gauge. Thus, the barometer had fallen 0.7 in., which is equal to 9.5 in. of water-gauge. During these operations the gas valve remained closed. The water pressure, therefore, ought to have risen from 1.3 inches to 10.8 inches (406.6 - 397.1 x 1.3 = 10.8), and even if the mine were not producing any gas during the above period (which, undoubtedly, was not the case), and had the pits been perfectly shut out from the atmosphere, the water-gauge would have shown a pressure far exceeding 10.8 in. The pressure, however, was 2.2 in., being an increase of only 0.9 in. Referring to a diagram showing the barometric and the water-gauge pressure on an equal scale, it appeared that if a barometer had been placed in the gas pipe, instead of the barometer remaining stationary along a line for a certain distance, showing the gas to have had a pressure of 10.8 in. (1.3 x 9.5) above the surface barometer line if felt 2.2 in. above that line. This could not have happened if the shafts had been completely shut off from the atmosphere and no gas had been issuing from the workings. These facts show that during the depression of the barometer at this period there must have been a large escape of gas either from the valve or a leakage at some of the shafts—very probably from No. 2 shaft, in which the scaffold was hung. The brickwork of this shaft must have been disturbed when the wooden stays were inserted to carry the pipes to supply air to the underground engine. Gas issuing from the goaves of a mine must be affected by a high or low state of the barometer, but it is not the relative height that guides the emission of the gas so long as that height is maintained.

It is during the change from a rising to a falling barometer, or vice versa, that the gas is most affected. The same law holds good whether the mine be deep or shallow. In one of the tables respecting the Oaks there was an error, for on June 24 it is recorded that there was a downcast pressure for 58 hours, with the barometer falling from 29.54 to 29.4 in.; the statement should have been a rising barometer from 29.5 to 29.4 in. In the diagrams he had prepared Mr. PEARCE said he had constructed them so as to show the relative pressures on one uniform scale in inches of water, so that if the barometer stood at 30 in., and the gas had a pressure of 13.6 above that of the atmosphere, this would give the height of the barometer if placed in the gas-pipe 31 in., 13.6 in. of water being equal to 1 in. of mercury, and so in proportion for any other pressure shown by the water-gauge. In speaking of outbursts of gas generally, Prof. GREEN saw one thing in particular that had struck him, and that was their profound ignorance about the state in which gas existed, and what sort of force it was that held it back in the coal. He did not think it could be simply mechanical pressure, but something corresponding with what they called molecular forces—those forces which hold together the smallest atoms of a body. They knew these forces were very powerful, but they knew nothing practically about them; and he had no doubt after experiments had been made respecting them that these carefully repeated observations would then come in and have immense value. He thought that one might safely say that these observations recorded here would not justify us in saying anything about the effect of variations in barometrical pressure, but he believed there might be many cases where it is just "touch and go"—where the forces tending to force it out are so nearly balanced that the least thing will turn the scale one way or the other; and should this be the case a little variation, small as it may be, in barometrical pressure may produce the difference. In all probability the great variations in pressure, when the pressure is suddenly increased, are due to further discharges of gas taking place suddenly in the pit. When one reservoir of gas has been relieved it will take off the pressure from some gas behind it. Mr. WARBURTON was of a similar opinion, and believed that if they knew more of molecular force they would trace from it the causes of the explosions, which more frequently occurred in winter than in summer. The thermal forces sustained their properties, and remained the same in winter as in summer. In summer they had them in the atmosphere, which may, and probably did, counterbalance the molecular forces in the cavity of the coal; but in winter, when these molecular forces have given way, it is not then probable that a deduction in the amount of these molecular forces is such as to cause the balance in the thermal forces existing in the coal to be so great as to bring about a great influx of gas. If that were so it might be worth while to take up the suggestion to see whether such a force had not existed, and probably that would lead them to find that the accidents occurring in winter were due to that cause. The barometer, of which they made so much, and which the law compelled them to take note, was a very different thing from thermal observations, and if they could better understand the forces that existed in proportion to the increased mobility of these molecules they would be better able to deal with their gases.

Mr. RAYNOR suggested that these outbursts might be accounted for by the ground weight, or the weight of the roof falling in and discharging the gas. The water under certain circumstances might seal up the cavities that were on a higher level, and the roof afterwards falling in it might eventually be overbalanced. In one instance some old workings were drowned out, and the water rose and fell in the shaft, although the belief was that the feeder of water was nearly exhausted. However, after a time the water rose several yards and fell, and they thought the engine men were not doing their duty, and the atmosphere during the time in some parts of the workings was under great pressure. When the water was nearly drawn away there would be a balance, and his impression was that when the water balance was overcome that the air might tear a passage along and the water again rush back to its place. But after the coming in of the roof it did not necessarily follow that it was actually inflammable gas; and perhaps the inordinate heat of the mine might have had something to do with the variations in pressure. The President said it was quite possible these sudden pressures of the gas might arise in the way described by Mr. RAYNOR—the gas accumulating in the deep part of the workings and rushing suddenly out where its pressure was greater than the pressure of water against it. But he could not imagine how there could be so many—almost hourly, or at least daily—sudden variations of pressure, which could be accounted for by the sudden outburst, because when one outburst of gas confined by water took place there must be, to produce such a sudden outburst, a great accumulation of gas behind so as to make a repetition come so often. Respecting outbursts of gas generally, it was quite certain that when a sudden outburst did take place, and not having been kept in by the water, but in the ordinary way, it always took place when there was a sufficient pressure in the goaf to allow the gas to come out. It could not be proved, perhaps, directly in many cases, but he had an instance where it had been proved directly that when the pressure was removed the gas came out. With respect to these outbursts always taking place in winter,

it was found by Mr. TAYLOR that in the Newcastle district four times as many explosions took place during the last three months of the year than during the first three months. But they all knew that in the North of England the greatest quantity of coal was worked, and the smallest quantity in the next three months, and it is from that cause alone that Mr. TAYLOR accounts for the frequency of explosion in October, November, and December. Many of the great explosions of which they knew, and, perhaps, all of them, happened under ordinary circumstances—a discharge of gas which came off suddenly, and which no amount of ventilation could carry away. Mr. PEARCE remarked that in the winter months the state of the barometer would be as favourable as it was in the summer, whilst in the winter they had a low temperature which was favourable to ventilation. As before stated, the discussion on the paper of Mr. PEARCE will take place at Leeds on Wednesday next.

EMMA SILVER MINING COMPANY.

SIR,—Mr. W. D. J. Foulkes, of the Western Circuit, has been instructed by the solicitor of the Emma Company to assist the company's American counsel, Mr. E. B. Stoughton, in the prosecution of the actions against the vendors, which are finally set down for hearing in the Supreme Court of New York on Nov. 28. Mr. Foulkes sails for New York on Saturday, with full powers under the company's seal, and takes with him all the necessary documents for the active prosecution of the case. In reference to the claims against the parties in England connected with the formation and promotion of the company, will you allow me to announce that Messrs. Coates and Hankey have paid the sum of 2000*l.* in full settlement of the company's claims against them. ALEXANDER W. MACDOUGALL, Queen Victoria-street, Nov. 1. Chairman.

THE LA MANCHE MINING COMPANY.

SIR,—I have just observed, in the Supplement to the Journal of Oct. 21, a letter relating to this property, signed "Henry Bradley," which from its utter incorrectness might be calculated to carry out the obvious intention of the writer, and injure the company in the opinion of those who were unacquainted with the writer and with the property. I do not purpose wasting your valuable space or my own time by going into detailed refutation of such gross misrepresentations which, no doubt, you would never have been asked to publish had the directors considered that the interests of the shareholders would have been advanced by retaining Mr. Bradley in the position of trust he once occupied as manager of the mine. I will only add that there is quite sufficient evidence in the office of the company to refute his injurious statements, and which is at any time available for the information of those concerned. London, Oct. 31. M. J. FEILDEN.

MANUFACTURE OF WHITE LEAD.

SIR,—Reference was some time since made in the *Mining Journal* to a process which had been invented for manufacturing white lead by the wet way, and as I think that just patented by Mr. Cookson, of Newcastle-on-Tyne, is far more likely to prove effectual, I now send you a description. He manufactures the white lead by the exposure of a solution of sub-acetate of lead to the action of carbonic acid gas in such a manner as to present the liquid to the action of the gas in the state of spray. Of course, the liquid, the gas, and the spray separately may be produced by any convenient means. By preference, he employs what is simply a large air-tight chamber, strong enough at the bottom to stand the weight of liquor and precipitated white lead. There are two man-holes at one side, out of which precipitated white lead is drawn after settling, and clear liquor run off. To obtain spray he sucks carbonic acid with a root blower, and forces it at a pressure of a few inches of water through a copper pipe with a long narrow slit. The sub-acetate is constantly trickling from the smaller pipe and running on to the sheet of gas escaping, and is blown into the finest of spray. He prefers to use two such sprays, placed at such an angle as when they meet they rise upwards. An exhaust pipe should be taken at some convenient place from the chamber, and the escaping gases should be filtered not to lose any of the acetate of lead which might be carried away in a spray or finely divided state, such acetate in practice is used over again for forming a fresh batch of sub-acetate for a further operation.

The way in which he prefers to prepare the solution of sub-acetate for use is by treating a solution of the acetate with litharge, by a special process which he has also patented. The details of the processes of manufacture may be varied; there are many ways of forming spray, and many ways of exposing spray to the action of carbonic acid gas, but he finds the above-described form an efficient one by which he can manipulate large quantities in an inexpensive mode. The white lead thus manufactured may be prepared for the market in the usual manner.—Oct. 28. METALLURGIST.

ROCK BORING MACHINES.

SIR,—I was very recently staying in the vicinity of Chester, and it occurred to me that it would be an opportune time to run down to the Minera Mines, and if possible to see the Darlington borers at work there. I accordingly applied to the proper source, and full permission to inspect them was courteously given. I arrived at the Wrexham Railway Station with a large crowd of people who were going to the new popular Exhibition in the town. Having found my way to Minera, and got an introduction to the manager, I changed my clothes, and jumping into a cage was soon landed at the 220 yard level. I was directed to a cross-cut leading off from the bottom of the shaft, in the forebreast of which two Darlington rock boring machines are at work, and excellent results being obtained.

The ground consists of mountain limestone of a very hard, short, and jointy character, the direction of the joints being almost vertical. To render it more difficult numerous strings of vughy spar traverse the whole. The machines are fixed to a substantial frame when at work, which allows perfect freedom in placing the holes in any direction, without unnecessary loss of time, from twenty to thirty minutes only being occupied in getting it into position. The frame is moved to and from the end on a light trolley, which also carries the tools and accessories.

The dimensions of the cross-cut are 6 ft. 9 in. wide by 7 ft. high. Cubical contents, 135½ ft. per lineal yard. Nine men are employed—three in each shift of eight hours duration, and they relieve in place. The number of holes necessary for a successful blast averages 25 to 30; usual depth 30 in., and sometimes 36 in. if the ground is favourable; diameter of holes at collar 1½ in., at bottom 1¼ in. Time required to bore 30 holes 6 hours. A blast effected just as I got down squared 2 ft. 4 in. of the forebreast. The ho'es are charged somewhat heavily with dynamite (about 5 lbs. being necessary to extract 1 yard) and fired electrically. The present rate of advance is 6 yards weekly, but I have no doubt when the men get thoroughly accustomed to the work and the organisation is more perfect this rate will be considerably increased. It should be borne in mind that the same men turn the stuff to the shaft and send it to surface, thus occupying a good bit of their time. They have a contract for 55 yards, and as a proof that they appreciate the advantages of machine boring they clamoured for an additional 20 yards. The price paid is 6*l.* per yard inclusive, the adventurers finding compressed air only. The price paid for similar ground driven by hand is 7*l.* 10*s.* per yard, the rate of progress being 4 yards monthly by six men.

The machines, which are overhauled occasionally and kept clean regularly, have been running more than six months (10 fms. of shaft and 15 fms. of cross-cut having been accomplished in that time), and no breakage has occurred during that period, and the cost of repairs has been very trifling. The general conclusions which any candid observer will arrive at, are—

1.—That by the employment of rock boring machines in sinking shafts and driving levels in hard ground, as much can be accomplished in three years as can be effected in twelve by hand labour alone.

2.—That the Darlington borers may be confidently reckoned upon to do their work without entailing excessive outlay or cost in keeping in repair, and from the simplicity of their construction they may be worked by ordinary miners.

3.—The duty of the two borers with nine men, at Minera, may be regarded as equal to the duty of 36 men without the aid of such machinery.

4.—No extensive mine having regard to a rapid rate of development should be without rock boring machinery.

5.—The saving in steel and smiths' cost is considerable, one tool in the machine boring as much as ten hand borers.

6.—In driving exploratory levels by boring machinery worked by compressed air there is really no limit to the length they may be driven without artificial ventilation. Compressed air is the most suitable agent to employ, as it may be carried in air-tight pipes to almost any depth, or distance, without any great loss of power.

7.—From the portability and effectiveness of the Darlington borer, I should say it could be advantageously used in stopes when they are tolerably uniform in width and extent, and I am not surprised to find that the inventor contemplates the construction of a small and simple machine exclusively for that purpose.

In conclusion, I would advise all those who condemn and ridicule mechanical boring just to take the trouble and go, as I did, and get ocular demonstration of the above facts. JOHN BARKELL, Ballaculish, Isle of Man, Oct. 31.

LEGITIMATE MINING—BWLCH UNITED.

SIR,—In August last I called your attention to the old-fashioned and legitimate way of bringing out mines, when "One and All" went in and risked their money alike, as opposed to the system adopted by the promoters of limited companies of late years, under which the greater part of the capital raised has gone to vendors instead of into the mines it was intended to work; and there can be no doubt whatever that much of the discredit that attaches to mining pursuits is owing to this circumstance, and the public only require to be fairly dealt with to bring it again into the position that its importance deserves.

On Sept. 2 I called your readers' attention to the Clementina Lead Mine, which was offered in 128 shares, at 20*l.* each, without any premium or promotion money. The shares, through my letter, were immediately taken up, the money paid, the mine put to work, and the shares are already at a considerable premium, with every prospect from the state of the mine of going even to double their present price. But I did not commence this letter simply to notice Clementina, which is now able to take care of itself, but to refer to another mine, which is undergoing resuscitation, and the direction of which I have been invited to join—the "*Bwlch United*," in Cardiganshire. It adjoins Goginan, which, under Messrs. Taylors' management, I am told, has yielded a profit of 60,000*l.* upon an outlay of 500*l.*, and the lode which produced this runs through the entire length of the Bwlch set.

Some years ago the late Bwlch Company gave 20,000*l.* for the mine, and commenced operations with 5000*l.* working capital; with this they raised lead ores to the value of 60,000*l.* above the shallow adit of Goginan, which enters the sett of Bwlch, and drains the water from it 50 fms. deep. Out of this 60,000*l.* the Bwlch paid a few dividends, but the greater part of the money was laid out in water-wheels, machinery, dressing-floors—all on a large scale—and in sinking two expensive shafts, each 50 fms. below the above-named adit; these shafts are both entering ore ground, but the company, some months ago, were left without a farthing to prosecute them further, and its affairs were placed under liquidation. The shafts, 100 fms. apart, and each coming into ore, at the depth of 100 fathoms are not yet so far down as the deep adit of Goginan, below which that company is getting its returns, near to the boundary of Bwlch, and within 50 fms. of the Bwlch shaft.

The lead ore is of rich quality, and fetches 17*l.* to 19*l.* per ton. The mine and machinery as it stands cannot have cost less than 50,000*l.*, and the prospects of early success are very great. In June last a new limited company was formed in 20,000 shares of 1*l.* each. Of these 10,000, fully paid-up, were taken by the liquidator for expenses, mine, machinery, and plant as it then stood; 5000 are to be kept in reserve; and 5000 offered to the public at par, for working capital—5*s.* on application, 5*s.* on allotment, 5*s.* in six months, 5*s.* in twelve months, or the whole to be paid at once, at the option of the applicant, or in case a transfer is made, so that all shares dealt in afterwards will be fully paid up. The agent considers 3000*l.* ample to bring the mine into a profitable state, so that it is not at all likely the reserve shares will ever have to be issued. Of the 5000 offered at par a large number have been already taken, and the rest are offered to early applicants; and by special arrangement with the liquidator, a bonus of fully paid-up shares, of 1*l.* each, out of the 10,000 liquidators' shares, will be given to all those who apply for shares on or before the 10th inst., as follows—an applicant for 250 shares will receive a bonus of 50 fully paid-up shares; an applicant for 200, 40 shares; 100, 20 shares; and 50, a bonus of 10 shares.

The secretary, Mr. W. Battye, of 16, Great Winchester-street, will afford every information required, and to him, or Messrs. Watson Brothers, 1, St. Michael's-alley, Cornhill, applications for shares may be addressed. J. Y. WATSON, F.G.S. 1, St. Michael's-alley, Cornhill, Nov. 1.

PEMBROKESHIRE.

SIR,—A very enthusiastic meeting was held on Friday, Oct. 27, at Newport, Pembrokeshire, for the purpose of taking into consideration the Taff Vale, Newport, and Fishguard proposed new railway. The company were represented by Messrs. Manning, Whitland, and Davies, Carmarthen, and Mr. Plummer, engineer, and there were present the M.P. for the county of Cardigan, the M.P. for the county of Pembroke, Mr. Colby, Pant-y-dry; Dr. Havard, of Newport; Dr. Harries, Glen-y-mor; Capt. Harries, Soar Hill, Dinas; and the Rev. J. Jenkins, Castle Hill. Similar meetings were held on the following day at other places in the county on this matter. A railway to St. David's would prove an inestimable benefit to the lower division of the county, and if such enterprising gentlemen as Messrs. Cropper and Macany, or the Barry Island Slate and Slab Quarry proprietors determine upon having it made it would be a certainty. This railway could be made cheap, as the cuttings are few, and there is no doubt the landowners would agree on agricultural value. It would prove the means of opening up these copper mines by the Barry Island Slate Quarries, which I have already referred to in the Journal of Oct. 7, as well as other branches of industry—building stones and sand manure for agricultural purposes. T. EVANS, Engineer. St. David's, Oct. 30.

CARDIGANSHIRE MINES—PENYBWLCH MINE.

SIR,—Will you kindly insert this extract from a note I have just received:—"Evan Evans, one of the tributaries at Penybwlch, has been here to-day, Oct. 30, and informed us that he has made a splendid discovery, and is breaking down stones of solid lead ore from 100 to 150 lbs." From the report you were kind enough to insert three weeks since it may be seen that I predicted that there was as much ore standing by the sides of the workings as has been taken away (about 1,000,000*l.* sterling), and this is now in a fair way of being verified. I also said I believe if the property were purchased on fair terms that 7500*l.* working capital would make it as good and as profitable as the Van. I have been told by one mining man that I have taken too sanguine a view of matters, but he has not condescended to inform me why he thinks so, but of this I am sure I have not taken so sanguine a view of this and of Esgair Fraith (a report of the latter of which I hope to see in your next) as he has of more than one of his own. This discovery being made at the adit level, and the shafts sunk 60 fms. under it, would enable any party to lay open immense quantities of rich ore ground without the trouble, time, and expense of sinking, and with judgment and economy these mines must become again what they formerly were—the richest mines worked in South Wales. Since I wrote the report of Esgair Fraith I believe from what has occurred that all the matrix mixed up and found in the lead and copper will be of great commercial value. It is composed of fluor-spar, carbonate of lime, &c., and in a mine adjoining (Camdwr Bach) very large quantity of stuff oozes from the lode, which if mixed with other ingredients form an excellent ochre. If we endeavour to utilise all the valuables contained in our mineral veins we shall

be better off, and with good boring machines, which are found to be well adapted to the strata of this county, and stone-breakers that not only save 80 per cent. in labour cost but half the wear and tear of crushing rolls, we have reason to believe a good time is coming. Many other properties are on the eve of moving, and there is every appearance of a brighter future before us.

Goginan, Oct. 31.

ABSALOM FRANCIS.

MINING IN CARDIGANSHIRE, AND CAEGYNNON, OR NORTH RHEIDOL MINE.

SIR,—Seeing a letter in last week's Journal, signed Sampson Trevelyan, C.M.E., in which he refers to Caegynon, or the now North Rheidol Mine. After some remarks about the mine, which, to say the least, are very difficult to understand, "They have an everlasting supply of water throughout the year, which no one has a right to touch, and as long as the hills last they will have no excuse in their dressing performances to complain of the shortness of water, as sometimes their neighbours are obliged to do." I do not know from whom Capt. S. Trevelyan derived this information, or whether it is his own invention, but whichever it may be it is not true. All the water-courses leading to Caegynon were made during the time I held the lease from the late Mrs. Hughes, of Glan Rheidol, and permission given, as a yearly tenant, to construct them through the ground leading through Tynyfron, the property of Col. Powell, and also through Troedrhwi Sebon, the then property of Sir Pryse Pryse, and who has reserved the right of water and minerals over this ground; so that should the water be wanted by either of these parties they can claim a right to the water, in conformity with the conditions of their tack notes; and that Tynyfron will do so within three months I have every reason to believe, and before that date the North Rheidol Company will undoubtedly have notice from Col. Powell's agent of their intention to appropriate the water now flowing through their ground to their own use.

I should have taken no notice of this statement (although the shareholders should not be wilfully misled) had I not written in my last, *re* Caegynon, that in the event of the Tynyfron Company erecting machinery they would be entitled to the use of the water-course and the water now being conveyed and flowing through their grant.

Goginan, Aberystwith, Oct. 30.

ABSALOM FRANCIS.

CORNISH MINING.

SIR,—Notwithstanding that we are passing through one of the most trying times ever known in the annals of mining, and all one can say with regard to the past and present system of management, keeping accounts, &c., can make matters no worse, it may not be amiss to refer to some of the existing evils and reasons why the price of tin may not have had altogether to do with the depression that has been our misfortune the last 18 months or more. In my humble opinion there are several causes for mining being at so low an ebb quite inseparable from the price of metal, and amongst them may be enumerated the want of vigorous development, the mismanagement of financial matters, the high rate of dues, the mode of selling tin, stocking tin, and last, but not least, the deplorable system of borrowing money of bankers and taking unlimited credit from the suppliers of materials for the use of several mines.

There is but little doubt that the tinwork operations being carried on in the county are on a very limited scale, and the chief aim of agents appears to be to discover tin by hook or by crook, and take it away, regardless of the cost. With tin at from 40s. to 44s. per ton it is very questionable if there are half-a-dozen mines in Cornwall legitimately paying the cost of bringing the ore to the surface and making it fit for the smelting-house. The standing charges in the first place—i.e., the charges for agency, enginemens, smiths, coals, candles, grease, and many other necessities, together with wear and tear of machinery—must all be considered as part and parcel of the cost, and to this must be added the charges for raising, stamping, dressing, burning, carriage (sometimes a heavy item), and many other expenses well known to those engaged in practical mining. Taking the gross expenditure into consideration, I venture to say that few tons of tin pass into the smelters' hands under 50s. to 55s. per ton. It is not difficult, therefore, to discern the end to such unprofitable business, and that this will in a great measure account for the heavy losses that have accrued to perhaps seven-eighths of the tin mines in the county. I have some remembrance of reading in your paper many months since that the manager of Dolcoath stated at some meeting that he could not raise tin for market under 65s. per ton, and I have no doubt that in all deep mines a corresponding aggregate may be taken as the result of the production of tin ore.

The next question to which I would refer is the bad system of issuing accounts adopted by many pursers and committees, and, I may say, by those who should set a better example. There are, doubtless, many that might be enumerated as being guilty of publishing statements of accounts that are, at least, misleading, but it will be enough to refer to three of the leading mines near Redruth which ought to be above suspicion—I allude to Carn Brea, Tincroft, and West Basset. The accounts rendered to the shareholders often come into my hands, and I do not hesitate to say that it is simply impossible for anyone, however well versed in mining accounts, to say what the liabilities of the adventurers are, or what is the actual financial position of these mines. Many months since the accounts of the two former mines were the subject of much correspondence in your paper, but I do not find the least improvement, or that the shareholders are one whit better off than they were at the time I allude to. From the last statement of accounts issued to the adventurers by the pursers of both Carn Brea and Tincroft it still appears that there are five months' costs and merchants' bills unchanged, amounting in the case of the former (taking the average of the last three months) to about 18,400s., and in the case of the latter a liability of (say) 11,300s., exclusive of the dividend, 1500s., which, of course, must be paid out of the bankers' advances. To these balances must be added the liability to the bankers and merchants, which would doubtless swell the indebtedness of the two mines to a sum fearful to contemplate. At West Basset it would be well for the shareholders to ascertain what is the amount owing to their bankers. Hearsay evidence must not be reported, however good the authority may be; but I fancy there is a surprise in store for the confiding shareholders. Now, let me ask the abuses here set forth likely to improve the position of mining, or are they likely to give confidence to speculators? My impression is that before embarking in mines as an investment every enquiry should be made as to the financial position of a company, for shareholders little know, as in the cases I have referred to, what is hanging over their heads, or how soon they may be called upon to liquidate a debt of which they had not the slightest knowledge. Mining accounts cannot be too clear and concise, and a cash account, with a faithful statement of liabilities and assets, and what every shareholder is legally and justly entitled to. I have little faith in profit and loss accounts alone, which are the rule amongst mine pursers, and believe that expenditure and receipts are more easily understood and much more satisfactory. A profit and loss account, if you like, as supplementary, but let us know what we have paid and received, and what we owe, and what we have to receive.

Obtaining advances from bankers for the purpose of developing the mine and paying dividends opens up a very grave question for the consideration of the bankers themselves, inasmuch as No. 7 clause in the Stannary Act distinctly says that "no company shall authorise the making of any special resolution empowering the shareholders to borrow money." The actual meaning of this, I infer, is that the true principle of the cost-book shall be carried out, and that in order to meet the loss or deficiency at any meeting of shareholders a call must be made, and when any profits the shareholders shall be entitled to a division of such surplus, after payment of all just debts. I maintain that the position of many of the local bankers is a precarious one, and although personally they may feel that they have ample security in individuals, legally they are, doubtless, out of court. With money going at a begging in London, 5 per cent. interest and a ½ per cent. for collecting cheques, may make it worth the risk, but I question whether their so readily consenting to make advances tends much to ameliorate the existing depression.

The question of royalty is one that deserves the earnest consideration of the lords under whom we hold our mining sets. Here and

there we hear of advantageous concessions being made, and, although the temporary reduction or remission of dues may be but a trifle to the wealthy landowners of the country, it is a great inducement to the shareholders to persevere in an energetic and vigorous development of their properties, and frequently results in making discoveries that may prove of mutual benefit to the lords and their tenants. There is a growing feeling that royalty ought only to be paid out of profits; and when we consider that we are under the obligation to pay for land damage (in which is included engine-houses and other necessary buildings) invariably 100s. an acre, it certainly seems rather hard that we should have to pay a percentage on all the ores we raise after going to the heavy expense of making our produce marketable. Some local landlords are more generous than others, but it is not my purpose to be personal; therefore, I refrain from reference to anyone in particular. All we can do is to hope that all interested in the welfare of mining and the mining population will see fit to render us that succour we one and all at this time are most justly entitled to.

Stocking tin is, to my mind, one of the most egregious blunders ever committed by any executive. It does not follow that because one lucky hit has been made by withholding tin from the market that it is always to be a paying game, and those gentlemen who have had so much confidence in their own foresight have ere this, I fancy, discovered their error. It is said, on good authority, that at least 1000 tons is being locked up in the county. It is true that this quantity, representing 40,000s., may be but, as it were, a drop in the ocean were an active demand for this metal to spring up; but the fact remains that it is in hand, and must sooner or later come upon the market. My idea is that the shareholders should know the worst, and that it would be a good policy on the part of those who have tin in hand to realise without delay at a sacrifice of a pound or two per ton. I have no doubt smelters would readily embrace the offer, and have little doubt that the result would be in a few days a substantial rise in the price of the metal. The present system of selling tin is unsatisfactory, there being no reason whatever why samples should not be sent to all the smelters, and the produce tendered for, as for lead ores. As it is, the ores are carried to a smelting company, and by some hocus pocus arrangement, probably satisfactory to both parties, a sale is effected. Every pound of tin should be weighed before it leaves the mine and weight agreed to at the smelting-house, and duplicate invoices furnished to the officials as well as to the agent.

The purchase of materials is a matter that the shareholders should pay more attention to; and I see no reason why, when practicable, the system of tender should not be resorted to. I say when practicable, because there are but few mines that are independent of their suppliers, but that is no reason why they should not be. Every company ought to be in a position to go where they like for their material; but, as things go, the solicitation of out-side competition would give ample employment to the Stannary Court. I have had some experience in dealing with merchants, and feel convinced that in the present state of rivalry we should do well to have tenders for all our materials, and contracts for three or six months. In some mines near Liskeard I believe this practice is adopted, and answers well, and why we should not comply with a similar custom I am at a loss to conceive. It may not be altogether agreeable to some agents, for obvious reasons, but pursers and committees should exercise their powers without fear or favour. In such articles as timber, coal, tallow, &c., I do not doubt but that outsiders could compete with the local suppliers, as a comparison of prices will sometimes show wide differences in the charges for this kind of material. I think myself that the fact that the indebtedness of the mines in Cornwall to merchants, amounting to many thousands of pounds, pretty well proves that large profits must be realised, otherwise the long credit system would long ago have come to grief.

I see that lately the question of the payment of pursers' and agents' salaries thirteen times in the year has again cropped up. I have always had an idea that the change was effected more for the benefit of the agents than the men, and I have not yet found that any advantage has accrued to the latter; but the extra 8, 10, or 12 guineas for the thirteenth month has, I have no doubt, been a great boon to many of the officials, who will advocate, peradventure, for the system to remain intact. It is said that the pursers of Carn Brea and Tincroft divide the original agency into twelve payments.

I am afraid I have encroached too much already upon your space to venture further into the affairs of our mining interests, but I think I have shown sufficient to satisfy the most fastidious that there is plenty of room for employment, and now matters are pretty well at the worst is the time to set our houses in order. A reaction must sooner or later set in, and although an improvement in the price of tin may make amends for many misdeeds, I hope that the change may be accompanied by a better system of financial management, and that mining may once more hold its own with any source of investment. There are instances, I have no doubt, where a rise in tin would only be used for the purpose of increasing illegitimate dividends, instead of wiping off back costs and debts that have been accumulating since times of prosperity; but, of course, if shareholders will remain blind to their own interests, it is their own look-out if they stumble into the mire.

DELTA.

LONGITUDINAL EXTENT OF LODES.

SIR,—I do not think "X. Y. Z." has read my last letter or he would not have said that I had got mixed over the Dyliffe lodes, and their Welsh names. To show that I am not, I repeat that the north lode is the Esqairgaired, the middle the Llechwedd-du, and the south the Dyliffe. The north lode runs as he states, but he is wrong in stating that the middle lode has not been seen between Dyliffe and Llechwedd-mawr, as it is upon this lode that a level has been driven and a shaft sunk at Hyddgen, the results from which have induced the proprietor to make a road and to erect machinery equal to the development to a large mine. I do not think your correspondent can be acquainted with the exact position of the boundary between Hyddgen and Llechwedd-mawr sets, as this middle lode is not in the latter set at all, but continues through the whole length of the former (about three miles), and runs from the western boundary into Cardiganshire. The agent at Hyddgen has, however, traced a branch or caunter lode running from its junction with the middle lode near Hyddgen shaft, about south-west across Llechwedd-mawr to Drosgol, where it makes a junction with the wide lode described in "X. Y. Z.'s" letter.

This wide lode, which is, no doubt, the south or Dyliffe lode proper, has not been seen in Hyddgen, but it must run through the south part of it along the side of the lonely valley so accurately described by your correspondent, and will, no doubt, be soon searched for. The road made to Hyddgen will, no doubt, help forward the development of a district about the great promise of which there can be little or no doubt.—Oct. 31.

CYMRAEG.

LONGITUDINAL EXTENT OF LODES—MONTGOMERYSHIRE AND CARDIGANSHIRE.

SIR,—The longitudinal extent of lodes must to a great extent be a matter of conjecture, because unless a lode be actually seen at surface it cannot be certain that even a lode seen at one place is the same as a lode seen in a place a mile or two further on, even though the bearings be identical. One thing, in my opinion, is certain, that the lode lately discovered at Llechwedd-mawr can never go to the Dyliffe Mine; it has been opened upon at surface for a distance of about a mile in many different places on the Llechwedd-mawr set, and the result of a dialling of these makes the lode almost exactly east and west, and from the nearest of these points Dyliffe Mine is situated about five miles distance, at an angle of 45° north of east, whilst at about eight miles due east lies the Van Mine, as a reference to a geological map will prove. Now, Sir, what is the bearing of the Van lode as taken in that mine? It is almost exactly east and west; is it not, therefore, much more reasonable to suppose that it is that lode which is to be seen than that the Dyliffe lode should get there? And is it not much more likely to expect to find the Van lode there than at Wye Valley, West Wye Valley, Great West Van, &c., all of which are at an angle of some 30° south of west from the Van Mine, and the last mentioned some 10 miles away from it. An ounce of fact is worth a pound of conjecture; and,

as a matter of fact, the lode at Llechwedd-mawr has been traced at surface for the whole distance between the latter place and the Van Mine, the bearing being all the while the same; yet scarcely any work has been done between these two places, in fact, I believe most of the ground is ungranted. At the same time, many thousands have been spent in what at best can be but a branch of the main (Van) lode, running at a bearing which differs some 30° from the bearing of that lode as worked in the Van Mine. Here is a chance for those who advocate the opening up of fresh ground in preference to spending thousands in worked out mines.

Nov. 2.

A. B. C.

VALUABLE DISCOVERY OF COPPER IN DEVONSHIRE.

SIR,—In the month of July last Capt. James Richards, late of the Ashburton United and Bagtor Mines, and myself obtained a letter of license from the stewards of the lord of the manor, Lord Clinton, to search for minerals in an estate called Wood Clift. We have been coasting from the above date, and discovered several veins or lodes producing tin, but in the last pit we have found a back of a splendid copper lode, containing black, yellow, grey, and almost malleable copper at the depth of 3 fms. One of the Cornish miners, called S. Trevelyan, who has had great practice abroad, says that he has seen backs of lodes similar produce malleable copper fetching 70s. per ton. There are five lodes in the sett, and adits can be driven that will drain the mine 40 fms.; a stream of water for all purposes, and about half a mile from the Ashburton Railway; the stratification is all that can be desired, being in a beautiful killas, with an elvan course running through the sett. It has been constantly said that if ever the land was explored minerals in abundance would be found. Within the last few days several of the Brookwood and other miners have been to see the discovery, all being delighted with what they have seen, and a hope that they might be employed, being near their homes. I shall be glad to dispose of a part of the right of this large property.

Ashburton, Nov. 2.

GEORGE SPARKS.

CWM DWYFOR MINE, CARNARVONSHIRE.

SIR,—This property will, it is to be feared, through the apathy and indifference of the majority of the shareholders in refusing to subscribe for the balance of the 5000s. worth of debentures recently offered, slip through our fingers. This is the more to be regretted as the mine is not an old and exhausted concern, but as depth was being gained appeared to promise well. The workings have not yet reached 20 fms., and they are only now attaining the depth at which a good course of ore may be expected. If we allow the company to be wound up in accordance with the resolution passed at the meeting held on the 18th inst. we shall, I fear, get nothing, as there are debts to a considerable amount. After all the money spent upon it the mine, if the reports made by Capt. Jewell and others upon it are reliable, certainly deserves further effort, and the necessary machinery having been all erected, with the exception of a set of Green's patent dressing machinery, but very little more money will, it would seem, be required to bring it into a profitable state.

If the present shareholders will not come forward, and are willing to allow all they have subscribed to be lost, those shareholders who believe in the property should, I think, form themselves into a new company, with a small capital of (say) 10,000s. to work it, when I do not doubt they would soon realise good profits. I trust, however, the present shareholders may see the folly of the course they are pursuing.—Oct. 31.

A SHAREHOLDER.

ST. AUSTELL MINING DISTRICT.

SIR,—I regret to find that a very promising little mine in St. Blazey (New Pembroke) has been obliged to yield to the unremunerative tin standard, thereby swelling the long list of deserted mines. I have no doubt that when the time—the "good time" of high prices—returns, as I hope it will return, this mine will be resuscitated. The mine is only about 100 fms. deep. It has a powerful pumping engine, and every appliance for working at very much deeper levels; but I expect to see that all the assets on the mine will go under the "hammer."

The oldest mine in the district is POLGOOTH, which is said to have been worked for tin many hundreds of years ago. Operations below the adit ceased a few years ago; they are now limited to the dressing of the "leavings," from which, I hear, a little profit is derived.

FOWEY CONSOLS, in Tywardreath parish, was worked from 50 to 60 years ago, I believe, without intermission till the abandonment, about seven years ago. The profit was about 220,000s. The late Mr. J. T. Treffry was the principal shareholder—a gentleman who did more for the labouring class than anyone in the county. He constructed quays and wharves at Par, constructed a railway to Newquay from Par, and another from Newquay to East Wheal Rose. About two miles from Par there is a viaduct most substantially built of granite, for the conveyance of water to Fowey Consols, and for carrying the railway over the Luxulian Valley. The Cornwall Minerals Railway Company, who purchased the railways from Mr. Treffry's trustees, have deviated the line of railway through that valley to avoid an incline plane, so that the viaduct is now merely an aqueduct. To do that the company had to make a deep cutting through solid granite rock to get out of that valley. Fowey Consols is 300 fms. below the adit, which is 40 fms. deep. The man or men who will undertake the resumption of these works must be more bold than prudent.

WEST FOWEY CONSOLS is in St. Blazey parish, and was worked by Messrs. Treffry and Co. many (about 30) years. The only dividend paid to shareholders was 2s. 6d. per share (6400 in number), but I do not think the company lost very heavily. Depth, 130 fms. under adit; adit, 10 fms. idle.

PAR CONSOLS, in St. Blazey, was also owned principally by the late Mr. Treffry. His trustees, by sale of the shares when the mine was prospering, realised a large sum. Produce, copper and tin. Profit about 200,000s.; depth, 230 fms. under adit; adit 28 fathoms. Now idle.

SOUTH FOWEY CONSOLS is in Tywardreath. It was lastly worked by a water-wheel for a few years, but without success. It is near the Cornwall Railway. Idle about two years. I am not aware that any mineral was sold from it.

TYWARDREATH MINE, on Par Green, was worked about 23 years ago (till the year 1855) for copper, but no return. This is also near the Cornwall Railway. In this mine the company sunk in the sand two iron tubes (shafts), 11 fms. long each, to the rock below.

WHEAL UNION, in Tywardreath, was worked by the late Mr. Treffry and Co. for several years, during which they returned only 60 tons of copper ore. There was a pumping-engine on it; the loss, therefore, must have been somewhat heavy. It has been idle for several years.

ST. BLAZEY CONSOLS, in St. Blazey parish, and near the village of that name, was worked for tin, of which there were some returns, but the mine went down, with a loss. The engine was rotary, serving the double purpose of pumping and stamping. It worked about four years. A part of this was subsequently worked under the name of East Fowey Consols, commenced in 1862, and stopped two years ago.

PRIDEAUX WOOD MINE, in Luxulian parish, has been tried several times for tin, but without success.

EAST CRINNIS, in St. Austell, was worked by Messrs. Taylor and Co., with a profit of about 110,000s. Afterwards it was worked under the management of the late Capt. J. Lyle, and subsequently by the trustees of the Treffry estate. Loss, 80,000s. Depth, 112 fms. No adit.

PEMBROKE MINE, adjoining East Crinnis, was worked simultaneously therewith; loss not known to me.

GREAT CRINNIS was worked about 60 years ago; profit (on copper) about 200,000s. Resumed about 20 years ago and stopped with a loss.

SOUTH CRINNIS was worked by the late Capt. F. Barratt and Co. for copper. Result unknown. Idle.

GREAT HEWAS MINE, in St. Ewe (a very old mine), was worked lastly by Capt. Carthew and Co. about 18 years ago, and the result was a loss, although the returns of tin were considerable. This

Meetings of Public Companies.

THE EXCHEQUER GOLD AND SILVER MINING COMPANY.

A special meeting of shareholders was held at the Charing Cross Hotel, on Wednesday.

The Right Hon. the Earl POULETT in the chair.

The meeting was called for the purpose of receiving a report from Messrs. F. W. Mansell and A. Parrick, who have recently returned from a visit to the mines in the district. There was a large and influential attendance of shareholders.

The CHAIRMAN: Gentlemen, I have thought it advisable to call a meeting of shareholders of the Exchequer and I.X.L. Companies to-day, thinking it would be very beneficial to you if I introduced Messrs. Mansell and Parrick, who have lately been out on a visit to the mines in that district, and who have thoroughly examined not only our mines but nearly all the mines in the district. (Cheers.) They have been home now some few days, and they have very kindly made out for me a detailed report of all our proceedings, which I think will be interesting to you. I trust you will pardon me if the statement is rather a lengthy one, and will take some little time to read it to you, but I will get through it as best I can. No doubt there are many shareholders who will be glad to put questions to Messrs. Mansell and Parrick, but by way of shortening the proceedings I have myself arranged a few questions which go into almost every subject, and which I will put when I have read the report. I will now read the report:—

MY LORDS AND GENTLEMEN.—We beg to hand you the following as our joint report upon your mines and property:—

THE MILL.—The mill is capable of crushing 20 to 25 tons of ore per day; it has 15 stamps, six amalgamating pans, and three 8 ft. settlers; one Knox pan, two Hendy's concentrators, and a rector furnace.

MOTIVE POWER.—One engine, 18-inch cylinder, 30-inch stroke, and Judson's governor; fly-wheel 8 ft. in diameter, and shaft 7 inches; two boilers 16 ft. long and 48 in. diameter, and steam drum 30 inches and 7 feet long. The boilers are fed by a double barrell pump. The situation of the mill cannot be surpassed, possessing everything essential to ensure successful work.

THE CHAMPION CHLORIDISING FURNACE.—This consists simply of two reverberatory furnaces, one placed above the other, 85 ft. long and 10 ft. high, built of brick, and provided with mechanical stirring apparatus, consisting of two endless chains working over four large metal wheels, so arranged that for one-half the time the chains are not exposed to the heat of the furnace. The feed and discharge are continuous, the roasting occupying from three to four hours, depending upon the character of the ore under treatment. The cost per ton, \$2 87 cents, and the percentage of the contents of the precious metals guaranteed to be extracted 85 per cent.

The mode of treatment may be thus explained:—The ore is broken into pieces of not more than 3 inches in diameter by a Blake Stone Crusher. It is then spread upon a drying kiln covered with cast-iron rib plates, and conveyed to the battery at the rate of 25 tons per 24 hours, where, being pulverised and passed through a fine screen of 1400 to 1600 meshes per square inch, it is carried to the furnace by means of conveyors placed in front and rear of the battery. It is then discharged into a large hopper, from which it is taken by a series of knife-like blades, carried over the upper and lower hearths of the reverberators. After three or four hours roasting it is discharged into an iron car. The duration of the roasting is regulated by the speed at which the blades or stirrers are permitted to travel along the furnace hearths. Thorough chlorination is effected by means of steam introduced by a series of pipes, thus being under perfect control: the degree of heat, less at the outside and gradually increased towards the discharge, is also under perfect control, being regulated by a series of dampers as well as by the position of the fires. The smoke finds its escape through a substantial chimney 50 ft. by 7 ft. in diameter (this has since been raised 20 feet). To furnish the chlorine salt is supplied through a revolving cylinder placed crosswise of the furnace, and so arranged as to feed at the rate necessary for the ore under treatment. The Exchequer ore is expected not to require more than 3 to 5 per cent. of salt. The total cost of the treatment is not more than \$3 per ton, whereas a Stetefeldt furnace, the cost of roasting would be \$12 per ton, whereas the O'Hara furnace, therefore, will effect a saving of not less than \$9 per ton. From the furnace the ore is carried to the pan room, and fed to six combination pans with steam chest bottoms, where it is mixed with quicksilver and kept in motion for from three to four hours, depending upon the character of the ore under treatment. During this process the precious metals are amalgamated with the quicksilver. It is then discharged into settlers and pans, and water is fed to dilute the contents sufficiently to admit of the deposition of the amalgam to a level groove in the bottom of the settlers, from which it passes to a receiver, but connected by an iron siphon. The settler is provided with a muller, to which are attached arms with sponges; these are kept slowly revolving in the diluted mass to encourage the deposition of the amalgam. The amalgam is then removed from the receivers, strained through thick canvas bags, retorted to drive off the quicksilver, melted into bars, assayed and stamped with their value in gold and silver. The O'Hara furnace was first erected in Idaho, and its operations are highly spoken of by Guido Küster—the authority *par excellence* on the Pacific Coast on all matters connected with the roasting of gold and silver ores. Here it is important to add that ores of the Peavine district are so rebellious, containing as they do antimony, arsenic, copper, zinc, blende, and lead, that all attempts failed to reduce them by the ordinary mill process with roasting. Mr. O'Hara undertook to erect a furnace upon the condition that, if he did not extract 80 per cent. of the precious metals contained in the ore, he should not receive anything for his work. The furnace was built with the result that 90 to 95 per cent. was easily obtained, assaying \$100 per ton. The ore had been previously taken to Reno and roasted by a Stetefeldt furnace, but no reduction was obtained, indeed, the treatment proved an utter failure. Mr. O'Hara has shown the fullest confidence in his furnace by erecting one at the Exchequer mill, with a capacity to treat 25 to 30 tons per 24 hours upon the distinct arrangement that he shall not receive any payment if the cost of roasting the ore exceeds \$1 per ton, or the percentage chloridised be less than 85 per cent., therefore, with the exception of \$2 87 cents to cover the cost of the metal work, the price of the furnace will be \$5000, and \$5000 for the royalty.

ASSAY OFFICE.—The assay office is attached to the mill, and conveniently situated, it is provided with two assay furnaces, in which all assays may be made at one time, and a cupel and large bullion-melting furnace—all admirably arranged. In the weighing room there are three sets of assay scales by the best makers, and a set of bullion scales by Troebner, of Philadelphia, capable of weighing 1500 lbs. of bullion at one time. This establishment is provided with all appliances necessary for conducting assaying in all its branches.

COST OF MILLING.—Two engineers at \$5 and \$4 and two amalgamators at \$5 per day each, two dry-kiln tenders \$1 each, two feeders \$1 each, carpenter and blacksmith \$5 each, wood, six cords, at \$3 per cord, oil, &c. (say), \$4, making a total of \$21 per ton. This is the number of tons treated daily is equal to \$3 25 per ton, to which has to be added \$3 per ton for roasting and (say) \$1 per ton loss of quicksilver, making the aggregate cost of crushing, roasting, and milling \$7 25 per ton.

SAW MILL.—The saw-mill is attached to the quartz-mill, and consists of two 60-in. circular saws, driven by a Capron turbine water wheel, with a fall of 27 ft. (when the connection shall be made with the new dam the fall will be almost doubled). The slabs are cut into 4 ft. lengths for furnace wood by a cross-cut swing-saw, and the waste slabs are "dumped" on the waste pile where they are corded until wanted for the furnace. A shingle saw has recently been added, which turns out shingles at the rate of 3000 in 12 hours. By this saving is effected—first of \$1 per cord in the cutting of the furnace wood; and, secondly, of \$4 per 1000 in the cost of shingles. The price delivered at the mill has been hitherto \$5 per 1000, and they are now produced at a cost of \$1 per 1000. Shingles are used in place of slates or tiles for covering roofs, &c.

LUMBER.—The lumber is conveyed from the mill on elevated tramways, and deposited at stations provided for the different sales. Lumber costs about \$12 per 1000 linear feet and sold at \$25.

TIMBER RANCHES.—The company own over 1200 acres of fine timber, consisting chiefly of pine and fir, so that an ample supply is provided for the use of the mine and mill at the mere cost of cutting—a very important consideration. Wood can be cut on these ranches at a cost of \$2 per cord. This effects a considerable saving to the company, the consumption being at the rate of something like ten cords daily. At Virginia City the Comstock Mines pay \$12 to \$14 per cord. Logging at the mill is greatly facilitated; hauling is done by eight oxen and a log-wagon.

CARPENTER'S AND BLACKSMITH'S SHOP.—A carpenter's shop, 30 ft. by 40, and a blacksmith's shop of the same size have been lately erected, and so constructed that the largest wagons can be repaired under cover.

BOARDING AND MANAGER'S HOUSE.—A boarding-house is attached to the mill for the accommodation of the employees. The manager's house is conveniently situated close to the mill and assay office. A stable is about to be erected for the accommodation of 24 horses required for hauling ore, &c., and the general work of the mill and mine.

WATER SUPPLY.—Silver Creek runs through the company's property to the mill and buildings, and furnishes an unlimited and permanent supply of the purest water.

MINES.—About 1½ mile in a southerly direction from the mill is Silver Mountain City, from which in a northerly direction at the head of Scandinavian canyon is the Exchequer Mine, which is reached by a good road. The hoisting works are covered by a structure built with 8 by 8 studding, trussed roofs, braced in the most substantial manner to resist the heaviest snow storms. The main hoisting building measures 30 ft. by 50 ft., and 20 ft. from floor to roof plate; the carpenter's shop is 20 ft. by 25 ft., and the blacksmith's shop 20 ft. by 20 ft. The hoisting frame is 24 ft. high, built of 13 in. by 14 in. timber. The hoisting shears are 5 ft. in diameter, and wide enough to run a 4-in. flat cable. The new engine and hoisting-drums are of the most approved construction, and of ample capacity to sink to a depth of 1000 ft. or 1200 ft. The boiler is of ample capacity to furnish all the steam required for the hoister and power-drills proposed to be introduced to cheapen and expedite the opening out of the mine in depth. Pumping is effected by one of Blake's steam-pumps, at the rate of 8000 gallons per hour at moderate speed, or 10,000 gallons at full speed. The engine-shaft is sunk in the hardest porphyry to a depth of 410 ft. divided into two compartments of 5 ft. square, substantially timbered with 8 by 8 sawn timber, placed 4 ft. apart, and lagged with 2 in. plank, and cased inside with 1 in. boards, the division pieces being 6 by 8. The eastern compartment is provided with a safety-cage of the most approved construction; this has been tested by cutting the rope while 2000 lbs. weight was in the cage, which fell only 4 in., when it was held by the guides. At each 100 ft. in the shaft a station is built 20 ft. long by 12 ft. high and 12 ft. wide. The cars are unloaded off the cage. Each drift is 1 ft. by 6 ft., and substantially timbered. The 100-ft. level has been run 485 ft., the 200-ft. level 562 ft., and the 300-ft. level 162 ft. From these drifts or levels many cross cuts have been put out to prove the lode, and at no place has it been less than 4 ft. wide, while in many places it measures as much as 40 ft. in width. It should be noted as a feature of great value that at no single point has the lode failed to show its true fissure character, proved by well-defined walls dipping 71° to 75° east (the same dip as the Comstock lode), as well as by the beautiful casing or selvage of floukan separating it from the

country rock, often polished as smooth as glass. Some 65 ft. above the level of the hoisting works, and before they were erected an exploring tunnel was driven 900 ft. to prove the lode, and throughout it maintained its true fissure character. About 10 ft. from the mouth of this tunnel an incline was sunk on the course of the lode to a depth of 140 ft., passing at many points through ore of high grade. From this incline levels were driven north and south, from some of which ore was taken assaying \$1200 to \$1400 per ton (specimens were sent to the London offices). The bottom of this incline was then connected by a rise to the 100-ft. level. Some good ore was taken from a stope commenced 20 ft. north from the chamber in the upper tunnel over the incline known as Roach's stope. Six cross cuts have been put out from the upper tunnel which was run at various points on the footwall of the lode, and wherever intersected it fully maintained its well defined character. An air-shaft was raised from a point in the upper tunnel 200 ft. north of the incline, coming out on surface under a tremendous cropping of gold and silver bearing quartz; this air-shaft is 120 ft. high. North of the mouth of this tunnel the company own 5000 ft., of which only 900 ft. have been prospected. All the miners with whom we conversed are of opinion that the most valuable part of the lode is yet unprospected; for this reason, that the country is less disturbed, and the croppings are so wide that four carriages could be driven abreast above them for a considerable distance. Upon a fine day Mount Davidson can be distinguished, and the bearing of the two lodges (Comstock and Exchequer) is almost the same. The company also owns the Acacia Mine, situated on the east side of the canyon. An adit (7 ft. by 6 ft.) has been driven 385 ft. with the intention to cross-cut to the engine-shaft after extending the adit some 385 ft. farther. This will tap the Fremont section of the Buckeye No. 2 lode 250 ft. below the level of the upper tunnel. As this adit has been thus far run in casing only, little is known of the Acacia lode; the cost of running will be more than repaid by the advantages to be derived. First, as an adit to relieve the upper workings of water to the depth of 250 ft.; and, secondly, in reducing the hauling some 70 ft. in its steepest part. As soon as this has been done it is proposed to remove the mine boarding-house to near the mouth of this tunnel, so that in the most stormy weather the mine will be accessible. Some 40 ft. from the entrance to the hoisting works is a loading dump and ore-shoot, into which the ore is fed after it has been spalled. The top of this dump is about 30 ft. above the level of the road, and so arranged that teams standing below the dump are loaded by a simple contrivance, economising time and labour. The manager has it in contemplation to erect at the mine an ore crusher of sufficient power to crush 25 to 30 tons per day to such a size as can be most easily conveyed in sluice-boxes laid along the side of the road from the mine to the mill, and there deposited in large reservoirs and settled ready for treatment. This is calculated to save the hauling cost, and at the same time increase the production of the stamps, the ore having been already partially pulverised. Should this plan be carried out, snowstorms will not interfere with the transportation of the ore to the mill during winter.

RESERVES.—As stated in our preliminary report, it is always difficult to estimate, even approximately, the quantity or value of available ore ground, but after a careful measurement we have no hesitation in stating that the available reserves of ore are as follows:—From the upper tunnel to grass 900 ft.; the initial height is 80 ft., and the height above the end 342 ft.; this stope area should yield 83,077 tons. From the 100 ft. level (driven 465 ft.) to the upper tunnel 175 ft., 37,557 tons. From the 200 ft. level, driven 504 ft., and 100 ft. high, 23,261 tons. From the 300 ft. level, driven 162 ft., and 100 ft. high, 7476 tons. Without including the ore to be opened out between the 400 ft. level, and the 300 ft. level, as soon as the cross-cut shall reach the lode, the above estimate shows an aggregate of 151,371 tons of available ore reserves, and deducting the whole of the ground from the upper tunnel to grass (or 83,077 tons), there are then 68,294 tons, calculating the lode at an average width of only 6 ft. (13 cubic feet of quartz, unbroken in the lode, are equal to 1 ton of 2000 lbs.) The following 15 assays were made from ore broken by ourselves at the respective points of operation specified:—Total value

Where taken from.	Gold.	Silver.	per ton of 2000 lbs.
300 ft. stope	\$ 45.46	\$ 299.28	\$ 344.74
300 " "	74.37	448.34	522.71
300 " "	74.37	442.47	516.84
300 " "	37.15	255.42	292.57
300 ft. end	24.79	164.54	189.33
300 " "	24.79	138.03	162.82
200 ft. stope	124.02	695.80	820.82
200 " "	152.93	710.79	863.72
200 " "	124.02	695.80	820.82
100 " "	94.17	517.01	611.18
200 " "	20.67	317.01	337.68
200 " "	41.34	741.75	783.09
100 " "	16.48	153.51	169.99
300 ft. end	45.46	348.20	393.66
140 " "	144.69	1068.50	1213.19
Total	\$991.83	\$5541.01	\$6532.89

Gold average, \$69 12 8 1/2; silver, \$369 40 1-1/2; total, \$435 52 9-15 per ton of 2000 lbs., or an average of (say) \$435.

The above assays show an average of \$435 per ton, but calculating the estimated ore reserves to yield only an average \$50 per ton, the money value represented is \$83,500.

The several stopes and ends are confirming in the most substantial manner the sanguine anticipations based upon the indications at and near surface. Every part of development shows marked features of progressive value, and it is by no means improbable that such results may be realised at an early date, to the great advantage of the Exchequer among the most successful mines known to English investors. It is only common fairness to your manager, Mr. Lewis Chalmers, to express our unequivocal opinion that he possesses in an eminent degree every qualification essential to an efficient discharge of the duties of his responsible position. Most proprietors are probably personally acquainted with Mr. Chalmers; to such our testimony is unnecessary as to his unimpeachable honour and untiring zeal and energy to promote the success of the several undertakings entrusted to his control. All shareholders may be assured that no effort is spared to place the mine and property of the company in a condition that shall permanently return profits that cannot fail to be satisfactory to all concerned.—F. W. MANSELL AND CO.

THE CHAIRMAN: Gentlemen, I have here, as I have said, a few questions which I have drafted out to ask Mr. Mansell, but after those questions have been put if there be any other question, which any shareholder would like to put to Mr. Mansell I beg they will do so. Mr. Mansell, will you kindly answer me this question—How long did you reside at Silver Mountain?—Mr. F. W. MANSELL: Between three and four weeks.

THE CHAIRMAN: Had you every possible access to the books, the mines, and the works generally?—Mr. MANSELL: Every access that we could possibly wish.

THE CHAIRMAN: You found every facility given you?—Mr. MANSELL: Yes.

THE CHAIRMAN: Did you arrive at any estimate as to the cost of raising the ore and extracting the precious metals, with a margin for deadwork sufficient to keep the reserves of ore in the mine well ahead of extraction?—Mr. MANSELL: The cost has already been ascertained in the report, but possibly the shareholders may not quite have understood it. The cost at the maximum will be \$20 per ton; it is less than that in reality, but we have put the maximum, and we shall be within the maximum in saying that \$20 per ton will be the outside cost of all the works for raising the ore, reducing it, and bringing it into bullion.

A SHAREHOLDER: Does that include every outlay?—Mr. A. PARRICK: Every outlay in the mine and at the mill.

THE SHAREHOLDER: Including the dead work?—Mr. A. PARRICK: Yes; and keeping the dead work well in advance of the reserves, and opening up the mine fairly.

THE CHAIRMAN: Did you, Mr. Mansell, see any ore at the mill, and will you state the probable quantity and net value per ton?—Mr. MANSELL: We calculate according to our estimate that you had when we left about 1000 tons on the mill dump. There are two dumps—the mill dump and the mine dump. These 1000 tons had been brought down, and all charges paid thereon, and therefore it has simply to be reduced at a cost of about \$7 per ton. You had about 1000 tons of the richest ore already been assayed in the report, but possibly the shareholders may not quite have understood it. The cost at the maximum will be \$20 per ton; it is less than that in reality, but we have put the maximum, and we shall be within the maximum in saying that \$20 per ton will be the outside cost of all the works for raising the ore, reducing it, and bringing it into bullion.

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THE SHAREHOLDER: Including the dead work?—Mr. A. PARRICK: Yes; and keeping the dead work well in advance of the reserves, and opening up the mine fairly.

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mine would pay well with tin at 90¢ per ton. It is not very deep, but requires a powerful pumping-engine. ST. AUSTELL CONSOLS adjoins Great Hewas, and was worked lastly under the management of Capt. John Nicholls, but went into liquidation soon after the completion of all the mechanical preparations for effectual development. Its principal produce is tin, but when it was previously worked under the management of Mr. R. H. Williams, now of Cuddra House, it yielded numerous other metals—copper, lead, blende, antimony, and bismuth, but not sufficient to pay.

POIMEAR MINE (copper) is in St. Austell parish; but the returns are if ever met the current cost. The late Capt. F. Barratt was the manager. Idle seven years. Shallow.

LITTLE CRINIS, on the edge of Crinnis Cliff, was worked in 1815, and abandoned till about two or three years ago, when it was resumed by Mr. R. H. Williams, a very intelligent mineralogist and miner, and the manager of Wheel Eliza, &c. There is a pumping-engine; no other machinery, except whims. Depth, 50 or 90 fms. under adit.

WHEEL ELIZA, in St. Blazey, is under the management of Mr. R. H. Williams; yields tin largely and profitably. It is the only profitable mine in the district. There are on the mine a pumping-engine, stamping-engine, and steam-whim. Mr. Williams has a very large interest in this property, and I congratulate him and his co-adventurers on their success.

CHARLESTOWN UNITED has been idle two years, in consequence of the low price of tin. It was worked (lastly) under Mr. R. H. Williams's management. The previous working was under that of Messrs. Taylor and Co. This mine will pay with tin at 80¢ per ton.

ROSCUDLE Mine is situated between Wheel Eliza and Charlestown United; was last worked by the late Mr. J. Morcom for copper. Idle 16 or 17 years.

POLHARMON, north of Fowey Consols, idle.

A deserted mining district is almost as melancholy as a "deserted village." This district is in the same predicament as Breage, Crown, Gwinnear, Gwennap, and St. Agnes. But for the china-clay works, I do not know to where the labourers would have to migrate. Notwithstanding the desertion of the mines, Par village looks lively, owing to the railways and the traffic thereon, and works connected therewith. CARLAZE Mine, or openwork, will be the subject of a future paper.—*Truro, Nov. 1.*

R. SYMONS.

IRON SHIPS AND GUNS FOR WAR PURPOSES.

the development of the mine?—**MR. MANSELL** said there was; the whole lot was filled with ore containing various percentages of gold.

THE CHAIRMAN: What do you suppose, judging from what you have seen, will be the average value of the ore reduced at the mill during the year 1877?

MR. MANSELL said that, roughly calculating, he estimated the value would be \$70 or \$80 per ton.

THE CHAIRMAN: And you consider, in stating that, you will be rather under than over the mark?—**MR. MANSELL** said his object had been to keep well under the mark rather than to exceed it. (Hear, hear.)

THE CHAIRMAN: How many tons of ore can the mill treat per day?—**MR. MANSELL:** From 25 to 30, and the furnace the same.

THE CHAIRMAN: Have you any doubt as to the efficiency of the O'Hara furnace? **MR. MANSELL** said that he and Mr. Parrick had long interviews with Mr. O'Hara, who was erecting the mill, and Mr. O'Hara had the most perfect confidence in its success, and was anxious to get it to work in order that it might be an advertisement to the neighbouring mines.

MR. PARRICK said that Mr. O'Hara had successfully treated much more rebellious ore in another district.

LORD RANELAGH asked how many tons of ore per day could be raised?—**MR. MANSELL:** About 25 or 30 tons.

THE CHAIRMAN: When did you leave the mine?—**MR. MANSELL:** The first week in September.

THE CHAIRMAN: In your estimates and replies to the previous questions you did not take into account any subsequent developments, discoveries, and increased reserves.—**MR. MANSELL** said none whatever. No notice whatever had been taken of the amount which had been raised since they left. From the 300 ft. level they were now down to the 400 ft. level, which gave 100 ft. more back. He explained that when they were talking of the 300 ft. level it really meant the 340 ft. level, inasmuch as they counted from the 140 ft. level, where the hoisting works were situated, and not from the surface.

THE CHAIRMAN said he wished to make one remark, and draw attention to one most important point. They had heard that the deeper they went the richer the ore got; but supposing they did not go a foot deeper than now, they had at present 181,371 tons of ore, which they might calculate would average not less than \$50 per ton; and estimating 300 working days in the year, and that they could crush 25 tons per day, there would be sufficient to last for the next 14 or 15 years. He did not think he could place the matter in a much clearer light.

MR. SYME said there was one question he should like to put to Mr. Mansell. It used to be a theory with the Californians, and it was justified by what took place in the first mine working on the Comstock Lode, that as they went down in depth the gold disappeared and the silver increased, but that was negated by more recent experience in the Consolidated Virginia, where the gold began to increase with depth. He should like to ask Mr. Mansell whether, judging from what he had seen, he was of opinion that in the Exchequer Mine the gold increased in richness as they went down in depth?—**MR. MANSELL** replied that the assay clearly showed that the deeper they went the greater was the percentage of gold, and at the same time the silver was not falling off.

MR. SYME: And you expect the gold to increase?—**MR. MANSELL** said that Mr. Parrick and himself had a long interview with Mr. John Mackay, of the Consolidated Virginia, and that gentleman stated that in the Comstock lode, from the 1000 to the 1500 ft. levels, the gold had increased to 50 per cent.

LORD RANELAGH asked whether all the departments—the mining, milling, roasting, and so on—would be capable of dealing with 25 tons per day?

MR. PARRICK said the real capacity was 30 tons per day.

A SHAREHOLDER: And is there sufficient hoisting machinery to send it to surface?—**MR. PARRICK** said the hoisting machinery was capable of hoisting 50 tons per day.

A SHAREHOLDER asked when the furnace was likely to be completed?—**MR. MANSELL:** I believe it is in full work at present. We do not know it, because we have received no advice, but when we left it was calculated that it would be at work the first week in October. The board had advised that no telegram should be sent until it had been tried a month, and he might mention that the first trial Mr. O'Hara had to run it himself experimentally on various grades of ore.

LORD RANELAGH: When will the first run commence?—**MR. PARRICK:** When the furnace is completed with its adjuncts.

MR. MANSELL, in answer to a further question, said that when he and Mr. Parrick were there, which was just two months ago, there were 1000 tons at the mill, and they were hauling down from the mines something like 25 tons per day. There was an abundant supply of timber surrounding the mill, and all they had to do was to cut it down, saw it, and send it down the shafts.

THE CHAIRMAN: Taking it at a rough estimate, who do you think the furnace will be at work?—**MR. MANSELL:** At the present moment.

MR. CHARLES said it seemed to him that working 300 days a year, at a calculation which had been given, there would be a profit of \$225,000 a year.

MR. PARRICK said he thought that would be a fair calculation at present.

MR. SLOUS asked if Mr. O'Hara was paid as the work proceeded?—**THE CHAIRMAN** said he was paid by instalments as the work progressed.

MR. SLOUS asked what guarantee there was that the work would ever be completed?—**THE CHAIRMAN** said that Mr. O'Hara was paid simply for the actual cost of the furnace, but he had also to receive \$5000 royalty, and therefore, unless the furnace did its work Mr. O'Hara would not receive his royalty and get paid for the work.—**MR. MANSELL** added Mr. O'Hara simply got the founder's cost till the work was completed.

THE CHAIRMAN said he thought there could not be much doubt about the efficiency of the furnace, because Mr. Chalmers had been to Peavine and there saw a similar furnace treating successfully a much more refractory class of ore.

IN ANSWER to Mr. JOY, Mr. MANSELL said the specimens he had taken were not picked out, but were taken at random, they were fair average specimens taken with the view of giving a fair idea of the value of the property.

MR. SAMUEL SMITH (a director) said that perhaps on this point it might be advisable to read an extract from a letter from Mr. Cooper, who was sent out to manage a mine in Colorado, and who at the request of the directors visited the Exchequer Mine in 1875. The following was an extract from a letter dated July, 1876:—"I went underground in the Exchequer, and was pleased to find it looking very much better than when I inspected it in the summer. The lode in the 300 ft. level drift is more settled and better than it was above, and they had a rich bunch of ore, which must be a new one, as they had none like it so near the shaft above. The 300 ft. drift is not yet under the rich shoot in the 200; it will probably take another month to get under it. From this latter in the stope I broke a lump of the ore about 7 lbs. in weight, and had a piece of it assayed by the territorial assayer here: it ran 19 1/4 ozs. in silver and \$31 in gold per ton of 2000 lbs. This was quartz and all, and if I had just picked out the ore it would have been very much higher. The ore reserves in the mine have increased considerably since I was there last. I am still of opinion that the deeper you go down the more valuable the lode will become. Mr. Chalmers was very busy making preparations to put up the O'Hara furnace, which I hope will answer."

MR. JOY said he thought the shareholders would like to know where Mr. Mansell got his average.—**MR. MANSELL** said he thought Mr. JOY had not paid proper attention to the report which had been read, otherwise he would have seen that the ore was valued at \$50 per ton.

MR. JOY: Upon what do you base that?—**MR. MANSELL:** You have much richer ore above this estimate, but very little below it. (Hear, hear.)

MR. JOY said that he had calculated it at the shallow tunnel at about \$10 per ton, and not better than \$13.

MR. SYME: Did you select these particular specimens?—**MR. JOY:** No; I picked them up at random as I walked along.

MR. PARRICK: You might have got some of the country rock. (A laugh.)

MR. SYME said Mr. Mansell had in his report very fairly given the grounds upon which he had based his estimates.

MR. PARRICK: How do you base your estimates in your telegram, Mr. JOY, in which you state there is \$1,000,000? (Hear, hear.)—**MR. JOY:** That was retracted afterwards.

MR. PARRICK: Oh, that was retracted afterwards was it? (A laugh.)

MR. LEWIS said he had a son working in the mine, and the private letters which he received did not differ in any way from what had been stated to-day, but, in fact, corroborated it. (Cheers.) He thought the shareholders would like to hear that.

THE CHAIRMAN: We are very much obliged to you. Nothing could be more satisfactory.

A SHAREHOLDER asked how the company was off for funds?—**MR. SYME** said the shareholders were met together to hear a report from Mr. Mansell and Mr. Parrick, and it was not a time to discuss financial matters. (Hear.)

THE CHAIRMAN said the shareholders might take it generally that the manager had had sufficient funds at present. The manager had made no complaint of any shortness of money, but the financial question could be gone into at the annual meeting. (Hear, hear.)—The proceedings then closed.

I.X.L. GOLD AND SILVER MINING COMPANY.

A special meeting of shareholders was held at the Charing Cross Hotel, on Wednesday.

The Right Hon. the Earl POLETT in the chair.

The meeting was called for the purpose of hearing a report from Messrs. Mansell and Parrick, who have visited the mine.

THE CHAIRMAN said he would not detain the shareholders with any remarks, but would at once read the report of Messrs. Mansell and Parrick:—

MR. LORDS AND GENTLEMEN:—This mine is situated near the head of the Roundabout Canyon, 537 feet south of and 400 feet lower than the Exchequer Mine, one and a-half miles from the Silver Mountain City, and 1000 feet above the level of Silver Creek. Since working was commenced a shaft has been sunk at the junction of the original Buckeye No. 1 and I.X.L. lodes, exactly 300 feet in a southerly direction from the mouth of the upper tunnel. The shaft is in two compartments, each 5 feet square, substantially timbered and lined, and sunk 210 feet, from which a cross-cut has been driven 105 feet to the lode; upon this a drift has been run 208 feet towards the bonanza, which in the upper and lower levels gave this mine its high character in 1863-4, resulting in the formation of Silver Mountain City, and the organization and establishment of the mining district. Not only has this ore body not yet been reached, but the drift has not been extended as far as the original I.X.L. location. The first work to be done is to drive the 400 ft. level to the Silver Mountain, which is expected to be at a distance of 210 ft., and at a cost of from \$12 to \$14 per foot. The upper tunnel has been driven 40 ft., and at no point out of the lode; 150 ft. from its mouth a rise was put up 8 ft. to surface, and a stope sunk 85 ft. by 29 ft., and risen 15 ft. above the roof of the drift for a distance of 35 ft. north of the air-shaft, the ore throughout returning from \$50 to \$250 per ton. North of the air-shaft, about 265 ft., a little overland, a top level has also been done, and high grade ore was produced. Some 85 ft. below the level of the upper level another drift—called the lower tunnel—has been run a distance of 300 ft. on the course of the lode, and at various points considerable quantities of ore have been extracted. This tunnel (7 ft. by 5 ft.) has also never been out of the lode. The shaft has been sunk 210 ft. below this lower tunnel, and, as already stated, driving commenced towards the bonanza. The company also own the Externate lode; samples of ore taken from surface produced \$100 per ton. Upon this lode the company has a run of 3000 ft., parallel with the main lode. This is an additional acquisition, and may in depth form a junction with the other lodes—a feature in itself of the greatest value. A trial shaft has been sunk 40 ft. This lode can be easily proved at greater depth by the mine tunnel, which is open upon it has been well defined. The hoisting works are in excellent condition. The main building measures 50 by 30 ft. from ground-sill to wall-plate, consisting of 8 by 8 timbers, strongly trussed and braced,

the roof having a high pitch on account of snow. The carpenter's shop occupies a space at right angles to the hoisting floor, and measures 40 by 24 ft. The blacksmith's shop stands at the mouth of the main tunnel, about 140 ft. north-east of hoisting works. It is proposed to replace the present engine by another of greater capacity, the present boiler power being equal, it is thought, to carry the shaft to a depth of 1000 ft. Connected with the hoisting floor by an iron tramway are the ore and waste "dumps," conveniently situated so as to save time and labour. We obtained much corroborative information as to the value of these mines from independent sources—among others, the Government Treasurer of the county and the Recorder of Silver Mountain district. These gentlemen, who are fully acquainted with the early history of the mines, stated to us that attention was first directed to the property by a box of its ore having been taken to San Francisco, which assayed more than \$250 per ton. It appears that ore of the value of \$50,000 was taken from a depth of only 20 ft. The bold and massive croppings of the lode at surface, its well defined character in the upper and main levels, where such rich developments have already been made, attest its true fissure character, assuring productiveness in depth proportionately with the scale upon which the operations shall be conducted. The company possesses valuable timber ranches, covering an area of 160 acres, and also a most excellent mill site, with ample and continuous water supply. The estimated available stopping ground is as follows:—From the upper tunnel to grass, 15,769 tons, taking the average width of the lode at 5 ft.; and from the lode to the upper tunnel, 20,423 tons. The shaft being sunk 210 ft. below the level of the lower tunnel, the drift run 200 ft. north on the course of the lode, and only 200 ft. have to be driven to reach the perpendicular of the rich ore in the upper workings, it may be fairly calculated that the value and extent of the estimated reserves will be doubled as soon as the drift shall be run as far as even the upper tunnel. Assuming this body of ore to yield an average of only \$50 per ton (and 20 assays show an average for silver of over \$200, and of gold \$5 per ton) the money value thereby represented is \$1,576,900, against 100,000, the capital of the company. The district, as a mining centre, is a highly favoured one, having all the essential features of the neighbouring Comstock district, with many additional physical advantages.—**F. W. MANSELL AND CO.**

THE CHAIRMAN said there were a few questions he should like to put to Mr. Mansell and Mr. Parrick. In the first place he would ask those gentlemen whether they had examined the I.X.L. Mine?

MR. MANSELL: We thoroughly examined the mine. We made at least a dozen visits to the surface and underground.

THE CHAIRMAN: Is there a body of ore, more or less valuable, already opened up in the present workings?—**MR. MANSELL:** Yes, in the deep adit, or main tunnel, the lode is fully 5 ft. wide, and a fine course of ore. We broke some rich ruby silver in the stope at the back, which afterwards assayed \$20.

THE CHAIRMAN: What value do you place upon this ore?—**MR. MANSELL:** To be within the mark, \$50 per ton.

THE CHAIRMAN: What quantity is there available according to the ordinary way of estimating?—**MR. MANSELL:** We have estimated 45,000 tons, which at \$50 per ton gives \$2,250,000 sterling.

THE CHAIRMAN: Has the I.X.L. Company any advantages in the working over the Exchequer Company, and will you state what they are?

MR. MANSELL said the I.X.L. Mine had the advantage of being lower down the mountain, and the mill site was much nearer the mine, which saved a large amount of labour in hauling the ore. Then, again, being lower down, the I.X.L. was in more settled ground, being in about the same position as the 400 ft. level in the Exchequer.

THE CHAIRMAN: What is your opinion as to the mill site?—**MR. MANSELL** said it was impossible to have a better position for the mill site, and that was also the opinion of Mr. Parrick, the engineer, the same day.

THE CHAIRMAN: Had you any evidence or confirmation of the fact that an extremely rich bonanza of ore had been discovered in the upper workings immediately below the surface?—**MR. MANSELL** said there was strong evidence of a large body of ore having been taken from the shallow workings. It was easy to see that the ore was going down in the sole of the level.

THE CHAIRMAN: Have you any reason to suppose that the rich body of ore continues in depth?—**MR. MANSELL** said there was every evidence and prospect of the same body of ore continuing in the deeper workings.

THE CHAIRMAN: What time do you calculate it will take for the deeper workings to come under this rich bonanza?—**MR. MANSELL** said they had 250 ft. to drive, and unless an unfavourable change took place in the ground the 200 should be under the bonanza by February next.

THE CHAIRMAN: What is the extent of the mineral ground owned by the company, and is there any timber land attached?—**MR. MANSELL:** There is a run of 4500 ft. on the Externate lode, and there are 150 acres of timber land.

THE CHAIRMAN: Is the timber very thick?—**MR. PARRICK:** Like raspberry cane. (A laugh.)

THE CHAIRMAN: Can you give the cost of developing the mine and reducing the ore at the mill per ton, as you have already done in the Exchequer case?

MR. MANSELL: We took it upon the same calculation. To be safe we estimated the total cost at \$20. We went very carefully into the expenses, and everything was taken into consideration.

THE CHAIRMAN: You left a margin?—**MR. PARRICK:** Yes; say \$3 per ton.

THE CHAIRMAN: Would it be unfair to assume that the I.X.L. Mine being lower down the mountain, and in more settled ground, that the ore in the 200 ft. level there will, in all probability equal in value the ore already developed in the Exchequer at the 300 ft. level, or even what may be shown in the 400 ft. level, and, so, how do you account for this?—**MR. MANSELL** said the ground was more settled from the very fact that the mine was lower down the mountain, besides which, the shareholders had before them the fact that the rich bonanza in the shallow workings gave ore to the value of \$50,000 from a depth of only 20 ft. from the surface.

MR. SYME: I was asked yesterday whether in going out to the I.X.L. and Exchequer Mines you were influenced by pure philanthropy?—**MR. PARRICK:** That word is not in Mr. Mansell's vocabulary. (A laugh.)

MR. MANSELL: I do not know what it means. (Loud laughter.) We went out to look at other properties, and whilst we were there we were anxious to see whether the Exchequer and I.X.L. were as good as they were represented to be. We also went to look at an adjoining property—the Isabelle—which we hope at an early day will be introduced on the market.

A SHAREHOLDER said he had had the pleasure of the acquaintance of Mr. Chalmers for many years, and he was no doubt that the results which had been attained were owing to the indomitable Scotch perseverance of that gentleman.

MR. MANSELL: That is so.

A SHAREHOLDER said that Mr. Chalmers had now been out there for many years, and all his statements had been fully authenticated by gentlemen who had visited the property. For his own part, he had the fullest confidence and faith in Mr. Chalmers, because all that gentleman had stated had been fully corroborated by competent judges, and he was sure the shareholders might place the most implicit reliance in what Mr. Chalmers said.

MR. SYME moved, and General CAMPBELL seconded, a cordial vote of thanks to Messrs. Mansell and Parrick for the valuable information given in their report.

The resolution was carried.

MR. PARRICK: My lords and gentlemen, we thank you very much for this mark of appreciation and confidence, and we hope, as we confidently believe, that each shareholder in these enterprises will be amply and handsomely rewarded for his patience and outlay. We also think, from personal examination of the district, accompanied by experienced experts that the Silver Mountain Canyon will become one of the most important mining centres on the Pacific Coast. (Cheers.)

On the motion of Mr. JOHN SUTHERS, seconded by a SHAREHOLDER, a cordial vote of thanks was then passed to the noble Chairman and directors.

THE CHAIRMAN, in acknowledging the compliment, said he hoped that before the month of February the shareholders would again be called together, because he hoped that by that time they would have full information from Mr. Chalmers as to how the furnace was progressing; also that the directors would have to ask the shareholders opinion regarding a dividend. (Cheers.)

The meeting then broke up.

WHEEL CREBOR MINING COMPANY.

A general meeting of shareholders was held at the offices of the company, St. Michael's-alley, Cornhill, on Wednesday.

Mr. J. Y. WATSON in the chair.

The notice calling the meeting was read by Mr. PARRY, the secretary.

The report of the agent was as follows:—

Nov. 1.—Since your last general meeting the 120 ft. level has been driven east 8 fms. 4 ft. 6 in., on a lode varying from 6 to 18 in. in width, but poor for the whole distance driven, and as it is now 22 fms. behind the 108 and 118 fms. behind the west end of the ore ground driven through at that level, I do not expect to see much improvement until I get under that point, which I calculate will take from three to four months to accomplish. In the 108 east we have driven 9 fms. on a lode varying from 6 to 7 ft. in width, and in value from 20 to 30¢ per fathom, and for a short distance was worth 40¢ per fathom. In the present end the lode is 5 ft. wide, worth fully 20¢ per fathom; a strong masterly looking lode, which to all appearance can hardly fail to hold down to the 120, and if so, after a rise was put through from the latter level to the 108, a large and profitable piece of ore ground will be opened out. The lode in the 73 east continues large, and of a very promising character, but is still unproductive. In the 48 east we are carrying 2 ft. of the north part of the lode, which has been poor for several fathoms, but in the present end it has a better appearance, and I hope will soon further improve. During the past two months the stopes in the back of the 48 have very much fallen off in value, so much so that the west stope would not pay to work. I, therefore, took the men from there, and put them to stope the bottom of the same level, where the lode is 4 ft. wide, worth 25¢ per fathom. The lode in No. 2, east stope, is worth 5¢ per fathom for copper, and will yield 5 tons of muffle per fathom. In conclusion, I beg to say the 108 east is opening out in a very satisfactory manner, and looks very promising to fully compensate for the falling off at the 48 ft. level.—**JOHN WATSON.**

THE CHAIRMAN moved that the accounts be allowed and passed, and printed and circulated amongst the shareholders, together with the agent's report and the proceedings of this meeting.

MR. CLIFT said he presumed the committee did not intend to propose any dividend to-day.

THE CHAIRMAN said no dividend would be proposed, because if a dividend was paid now it might have to be repaid hereafter. The quantity of copper sold had not come up to what was anticipated, and therefore the receipts had not been so large as they otherwise would have been. At the last meeting a new lease was executed from the Duke of Bedford, and afterwards the Duke's solicitor sent in a bill for \$71,100, which the committee considered a very large amount, as the usual amount of solicitors' charges for such lease was about 30¢ or 35¢. The committee had done their best to get a reduction, but had not been successful, and he supposed the bill must be paid, but he certainly considered it a very large amount.

A short discussion ensued, in the course of which several gentlemen expressed an opinion that the charge was exorbitant, but it was decided to pay the account, and that the company had been stopped working fresh ground until it was paid.

A SHAREHOLDER said he came prepared to move that a dividend of 1s. 6d. per share be declared, which would absorb \$450, and leave a balance of \$600.

THE CHAIRMAN pointed out that although there were 1099. 4s. 7d. of assets over liabilities, still there was not sufficient cash in hand to pay a dividend. There was a balance of \$300, but a great part of that had gone to pay the interest on the payment of the cost of the shafts and bills.

MR. CLIFT and two or three shareholders said it was much better to defer any

payment of dividend for the present, and they must, so that at the next meeting they might be able to propose a dividend.

The resolution for allowing the passing the accounts was then put and carried.

MR. F. CLIFT was then elected a member of the committee, thus raising the number of the committee from two to three.

A vote of thanks to the Chairman closed the proceedings.

SOUTH CARADON MINING COMPANY.

At a general meeting of shareholders, held at the mine, on Monday (Mr. Richard Kittow in the chair), the accounts for sixth, seventh, and eighth months, showing a profit of 10677. 9s. 2d., were allowed and passed. A dividend of 1024. (2¢ per share) was declared, and the balance of 1977. 6s. carried to the credit of next account. The following report was read:—

Oct. 31.—There is nothing whatever new to notice in the general character of the mine; but it is my pleasure to inform you that it is still looking well, and there is every reason to believe it will long continue.—**JOHN BOLMAN.**

WHEEL KITTY MINING COMPANY.

The general meeting of shareholders was held at the company's offices, Austinfriars, on Tuesday.—**MR. CHESTER CHESTON** in the chair.

MR. JAMES HICKEY (the secretary) read the notice convening the meeting, and the minutes of the preceding one, which were confirmed; the statement of accounts, showing a credit balance of 5023. 13s. 8d., and the subjoined report of the agents were then submitted:—

Oct. 30.—In the 154 ft. level, driving east and west of cross cut, the lode is under the 154 ft. level, and shall continue the sinking of the new shaft to reach the 168 ft. level as early as possible. In the 142 ft. level, driving west of new shaft, the lode is worth for tin 8¢ per fathom. In the 142 ft. level, driving east of shaft, the lode is worth for tin 11¢ per fathom. In the 130 ft. level, driving of shaft the lode is worth for tin 12¢ per fathom. In the 65 ft. level, driving west of shaft, the lode is yielding saving work for tin—Old Lode. In the 60 ft. level, driving east of old engine shaft, the lode is worth for tin 7¢ per fathom. In the 100 ft. level, driving west of old engine shaft, the lode is worth for tin 10¢ per fathom. We have sold 50 tons of tin during the quarter, which would have been a good profit with a reasonable price, as you will see from the annexed statement of accounts. We trust the lowest prices have been seen for the price of tin, and that an upward tendency has set in; should this prove to be correct, we shall soon be in a position to resume former dividends.—**W. TEAGUE, S. DAVY, R. HARRIS.**

THE CHAIRMAN said they had heard the statement of accounts, which showed that they had made a profit of about 3000, their credit balance being increased by that amount. The report was also a very encouraging one. There had been a satisfactory rise in tin during the past week, and with 100¢ per ton further rise they would be able to declare their former dividends.

MR. PIRK said that the general feeling in Cornwall was that they had reached the lowest price for tin. By his rise of 3¢, they obtained 100¢ more for the parcel than they would have done had they sold a week previously.

Upon the proposition of Mr. JUSTICE, seconded by Mr. PIRK, the report and accounts were then unanimously adopted.

MR. HICKEY, in reply to a SHAREHOLDER, stated that the quantity of tin raised had been about the same as in the previous quarter, and the price obtained was a trifle better. The last sale of tin included in the accounts was that made yesterday, and the costs were charged up to June.

The usual complimentary vote of thanks to the Chairman terminated the proceedings.

BLUE HILLS MINING COMPANY.

The general meeting of shareholders was held at the company's offices, Austinfriars, on Tuesday.—**MR. CHESTER CHESTON** in the chair.

MR. JAMES HICKEY (the secretary) read the notice convening the meeting, and the minutes of the preceding one, which were confirmed. The statement of accounts, showing a debit balance of 6684. 2s. 2d., and the subjoined report of the agents were then submitted:—

Oct. 23.—In opening out on the lode at the top of the rise from the engine shaft, in the 80, another part of the lode was discovered still above the gossan, and just opposite the lode referred to in our report for the last meeting, and consequently is about 6 fathoms over that part on which the lode is sunk from the 68 ft. level; when this part was first discovered in the rise it showed a good stone of tin, and this led us to open out more particularly on this part of the lode. A level is now being extended on it close by the gossan; some 7 fathoms throughout this distance it has been more or less productive, varying in width from a few inches to 2 feet, and in value from 5¢ to 13¢ per fathom. The tin being of that class which is usually found in the Pink lode, in the most productive part of it, we think the barren ground has been at length sunk through, and the upper portion of the productive ground is now reached. The opening out of this lode, just to show it close by the gossan, was continued as long as possible, until the accumulated stuff compelled us some five weeks since to adopt means to haul it to the surface, by fixing a skip-road from surface to the 80 ft. level; this being completed, and the stuff drawn away, the lode is now being stoped, and during the past fortnight six men have broken and sampled 16 cwt. of tin therefrom. In addition to this important feature in the prospective future, the Penhalls people are opening out also a profitable lode (supposed to be our Wheel Kitty lode) in the 30 ft. level, not more than 4 to 5 fathoms from the Blue Hills boundary, where eight men during the past month have broken 2 tons of tin. Therefore, we consider the prospects of the mine are now far more cheering than at any former period, especially so in the bottom of the mine. For the immediate development of the mine we suggest that the tin ground be followed above the 80 ft. level as far as payable, and if found to continue up, let a sort of cross-cut rise be put up from the shaft to intersect the lode about midway between the 80 and 60 ft. levels. Also to extend the present rise 5 fathoms higher, to see this part of the lode below the gossan (on a cross-cut north from the bottom of the shaft), where we expect the best results. And if the north lode at Penhalls be found to occasionally touch the boundary, then sink a shaft from surface to intersect that lode (say) 20 to 25 fathoms deep, then continue on its course, and should the Pink lode open out satisfactorily at the engine-shaft the proposed new shaft can be continued perpendicularly some 40 fathoms deeper, and so command both lodes. This, in our opinion, will not only enable the mine to be fully developed, but will open up

Claim, Black Lead, at Gulfrong, are now in the Museum of Mines.

containing 15 inches of solid dolomite ore, with pituitous metal intermixed. The assays show for clean pituitous ore, 13.13 per cent. copper; green ore, with specks of pituitous, 8.64 per cent. Probably taking the whole 15 in. of ore it would assay from \$400 to \$500 per ton. Being so close to the slide I did not expect to find the lode formed for some few fathoms yet, and as might be expected it is narrow, and widens to the north, but for the same reason it may not continue until we get further from the slide. That it is the same lode we had in the 32 is proved by the water draining from that level in two hours after the ore was cut. The winze commenced in the 32 some time since it being cleaned up, and next week we shall commence to sink in the 42, and at once drive south to meet the level from the shaft. The ground is very easy for both driving north and sinking the winze. In the cross-cut in front of the Tiro shaft, mentioned last week as having ore in the end, the ore is not solid, but consists of large balls of green ore of good quality. We are still driving to cut the face of the slide, on which, judging by our previous workings, I expect the ore to make. The improvement in the new east lode continues.

Capt. Sprague, Sept. 7: We are sorry to say the lode in the 42 north is poor; must hope it will make again shortly. In the winze sinking below the 32 the lode produces stones of ore. The lode in the slope above the 10 produces favourably. There is not much alteration in the slopes on the Red south and new east lodes since last week; produces just as usual. The Purissima slope is getting near the old workings, and will soon be finished. We are driving north in the lode intersected opposite the engine-shaft; produces saving work.

Frank W. Breach, Sept. 7: In the new east lode the south end is now some 35 ft. east of the Tiro shaft on the plan. To the south of the north slide, in the cross-cut from the tunnel, we have cut a branch of green ore 4 ft. wide, not very solid, but the ore is of average quality, and equal to 4 ft. of solid ore. We are now driving on this vein, as I believe from its position the lode does not continue so far east. In the 42 in the Tiro we are driving north and south. To the south we have 18 in. of rich green ore, and the lode is passing west of the north slide, giving hopes of its continuance to the south, and of the slide itself dying out. To the north the lode rapidly widens, and the green ore is dying out, and it gives every indication of making a lode of black ore. We already have black ore on the foot and hanging walls. The footwall towards the north—that in the 32—has a thin underlay to the west, is going almost down, giving more room for ore to make. Altogether the appearances are very favourable for expecting ore in this level. The winze in the 32 contains more green ore than we had in the level, and improves as we sink, and here the footwall is also going more down, as if adjusting itself in the 42. In these three places the work is being forced to the utmost.

Capt. Sprague, Sept. 14: The lode in the 42 north shows spots of black ore sometimes, but of no value. In the winze sinking below the 32 ft. level the lode is poor, composed chiefly of spar. The lode in the slope above the 10 produces a few feet in length left. The slope on new east lode is improved, while the slope on Red south lode is not so productive as for some time past. These slopes are about 200 ft. in length, but near 75 ft. in them contains no ore. The level driving north from cross-cut, opposite engine-shaft, is communicated with the old level under Red south lode.

Frank W. Breach, Sept. 14: In the 42 south the ore has pinched out on passing the slide, or rather, where the slide would have been. The lode continues, being slightly thrown to the west. This is the first place where the surface down, that the lode has passed the west point of the slide, and I think of continuing the level to the south to ascertain the direction it holds, and also see if ore does not make again. In the 42 north the lode makes black ore, and we now have a solid vein 6 in. wide, and the lode itself widening as we drive. I have no assay yet of this ore. The winze in the 32 is in a rough sparry lode, widening as it goes down, with stones of good green ore. The new east lode remains with but little alteration. The black ore in the north end, if anything, is rather improved.

The following telegram was received from Breach on Oct. 17: "We are sinking the 32 ft. level to the 42 ft. level, on the ore discovered some time since, and near where the rich stones of copper ore were raised, and it looks promising at the 37 ft. level."

FOREIGN MINES.

RICHMOND CONSOLIDATED.—The directors have declared a dividend of 7s. 6d. per share, payable on and after the 5th inst., at the Union Bank of London.

ST. JOHN DEL REY.—Telegram from Morro Velho, dated Rio de Janeiro, Oct. 23: Produce eight days, first division of October, 10,500 cts., 4068. Yield, 7 cts. per ton. Profit for the month of September, 6800.

DON PEDRO.—Telegram from Rio, dated Oct. 3: Produce cleaned up (first division of October), 1300 cts.

RICHMOND CONSOLIDATED.—Telegram: Week's run, \$40,000. The two iron furnaces re-started.

R. Rickard. Oct. 6: The men in the 800 have been occupied in putting timbers and cutting ground for a start at the bottom of the winze. The 700 ft. drift is being driven in limestone towards the ore making down from the slope above. The 600 drift is still in shale; it is now within a short distance of the winze sunk from the slope, which is in ore; the ore in this part of the mine is making much, nearer to the shale than anywhere seen in the mine. We shall have to drive the 600 ft. drift at least 150 ft. to get under the winze being sunk from the south-east part of the high slope, which is down 70 feet below the 500 ft. level, and in good ore. The two places in which we have sunk from the slopes are in good ore, which is more to the south-east than the ore worked on in the 600. Communication has been made between the Lizette Tunnel extension and the west side of the hill. We shall now be able to extract ore from this portion of the mine, it being rich in gold it will increase the average assay in the ore smelted, which has been low of late. We have in this part of the mine a large quantity of ore; we can trace ore 150 ft. in height, but cannot tell what thickness it is, not having explored it yet. The smelting has been very slow for the past week on account of slackness of blast. The machinery has given considerable trouble.

BLUE TENT (Gold).—D. T. Hughes, Oct. 7: We have opened the shaft very successfully at South Yuba without being blocked up once, and have a night force blasting down the cuts with all possible speed; the bottom gravel looks well, and everything works satisfactory at present. We are getting ahead quite rapidly at the enterprise also, and will have one pipe laid to near the pit next week. I think we have only a few men at present on the job, as there is no hurry for it; the heavy and expensive portions are done.

CEADAR CREEK (Gold).—T. B. Anderson, Oct. 10: I last had this pleasure on Sept. 29, since when I have been working this work to its utmost in every department. —Yankee Tunnel: With this work we have been very successful. During the week ending Sept. 30 we advanced 37 ft., making a total for the month of September of 181 ft. I sailed 180 ft. for the reason that I did not think the odd foot would be worth the cost. The cost of running the tunnel last month amounted to \$444.30, an average of \$24.37 per foot; as mentioned in a former letter, the rock was very unfavourable for blasting, and required nearly double the quantity of dynamite that we had been using. It was necessary frequently to load and blast the holes the second, and in some cases the third time. For comparison I will state that during August we advanced 160 ft., using dynamite to the amount of \$1083.63—an average of \$6.77 per foot. During September we advanced 181 ft., using dynamite to the amount of \$2901.83—an average of \$16.03 per foot. Notwithstanding the above-mentioned increase in the quantity of dynamite used, the result of the month's work, as a whole, is to me very satisfactory, and I doubt not will be so considered by you. You, no doubt, now realise that the distance is so great (200 ft.) that the expense of removing the debris is quite an item. We are rigged, however, to accomplish that object as economically as possible. We have two large cars (24 x 6 ft.), so as to have one loading whilst the other is going out, and a mule on each shift to draw the empty car back. During the week ending Oct. 7 we worked eight shifts, and advanced 25.47 ft., which completed this section of the main tunnel. We are now driving the branch, and as the rock is favourable I anticipate that we shall finish it early next week, provided we are not delayed for want of water with which to run the machinery. Our water is very low; there is hardly enough running to drive our compressors on. Yesterday we were obliged to lay off all day to allow it to accumulate, and it is possible that we may be obliged to do this again, which will cause delay. The shaft is completed. The depth to grade of the tunnel below is 182.27 ft. We sunk 151 ft., and reached a depth to correspond with the roof of the branch tunnel—allowing 3 ft. for extra grade. As I was anxious to start the incline from the shaft I concluded to finish from the branch below, consequently ceased work and called the shaft completed. The depth sunk last month was 43 ft., at a cost of \$274.69. Incline: This work is progressing well, and we shall, in all probability, have it finished by the time the branch is completed.

ARGENTINE COMPANY.—Report for August: South Mines: The workings at the Captain and Chairman sections I have suspended for the time, and put the men there employed to work in the Piqué section.—Piqué Section: In the 44 north we have made tolerably good progress, considering the hardness of the ground; the lode is at present end wide, and producing good stones of ore, and has a most promising appearance. We have communicated the 44 south, on the eastern part of the lode, to the course of ore south of the cross-cut, referred to in our last report, and for all the distance driven, about 5 fathoms, we have had a rich lode of pyrites ore, which is, doubtless, a continuation of the course of ore we have north behind it. The level is being continued on what appears to be the main lode shifted east by a cross-course; the ground is at present unsettled, and letting out water from the bottom of the level, which appears to be draining the Puntillo, as the water there is abating. The 44 south, on the lode underlying east, has dropped in from the western side of the level, and as it has a very promising appearance, and is likely to come in contact with the course of ore making towards it from the east I have resumed the drive; the lode is 2 ft. wide, and producing good stones of ore. The slopes north and south of the cross-cut, in the bottom of the 44, contain much more pyrites, and are yielding from 15 to 50 tons of ore per fathom; the lode shows not the least symptom of falling off in size or quality. I had a sample fairly taken from a pile broken all over the deepest point of the slopes—in fact, as deep as we could go for water, and it assayed fine gold 2.02, 16 dwt. 15 grs., and silver 2.02, 2 dwt. 11 grs. It is my belief that the assay was under the real value of the ore, as the water prevented taking up a fair proportion of the "small," which is the richest in gold.

Cross-course: In the east side of the north slopes we have discovered what appears to be a continuation of the cross-course referred to in last report; it is about 3 ft. wide, and seems to be rich in gold. In the back of the 44 north, adjacent to where the run was, we have opened up a large piece of ground, on which we shall leave in reserve until better supplied with timber. In the back of the 44 north, at the end of the old workings, we have discovered a rich piece of lode, principally pyrites. It is exposed from 2 to 3 fms. long and 2 fms. high, and cuts into about 4 ft., but shows no wall. A sample taken from it assayed fine gold 2.02, 19 dwt., and fine silver 2.02, 19 dwt. Underlay Shaft: The shaft is now down about 8 fms., and is being pushed on as fast as possible. Progress has not been so rapid as anticipated, owing to the hardness of the ground, which requires careful timbering.—Rise in back of 44 south: In the early part of next month (September) we shall commence rising up against the shaft, and should the ground continue without change, in the course of six weeks or two months we shall hole.

REDUCTION DEPARTMENT.—Owing to a snowstorm, and an attempt of the woodmen to raise the price of wood, the stamps have been thrown idle for eight days during this month. The number of heads working have been 20, and the quantity of ore stamped 400 tons, and the amount of gold extracted 156 ozs. 12 dwt. 21 grs. But a small proportion of the ore passed through the stamps has been treated from want of calcining and concentrating appliances. The new oven is put to work, and does its work very well, calcining about 4 tons of ore in 24 hours at a cost of cost in fuel, but to calcine the amount of ore we shall have to treat in an economical and speedy manner I would recommend the sending out and erection of an

Oxland and Hooking's calciner as speedily as possible. In the meanwhile we will treat as much pyrites ore as our furnaces will calcine, and stamp the gossan ore, which requires no calcination.

REDUCTION REPORT.—Bar gold obtained in 23 days' run from 492 tons of ore treated, 138 ozs. 12 dwt. 21 grs.—an average per ton of 7 dwt. 7½ grs. We should have obtained more gold had we not been stopped by a snowstorm, which wetted all our belts and did them considerable injury, and for want of fuel for the engine and furnace. The ore treated in the latter part of the month was considerably richer, but contains about 70° of iron pyrites and zinc-blende, which is difficult to treat, and for which we have not the necessary appliances. We have started a new arrastre, and in about a week shall have a new bed prepared to replace one of the old ones that has gone through. The old furnace was stopped and the new one started on the 18th ult., and I am glad to say does its work very well and will supply all the arrastres we are at present working, but as soon as the others are erected we shall require more calcining power if the ore sent down continues to contain such a large percentage of pyrites. It is necessary for us to put at the old machinery in good order to be depended on, erect the six new arrastres which have arrived, and four new buddies, which have partly arrived; put a weighbridge at back of stone-breaker, on level of stamps floors, to weigh all the ore treated, which has now to be estimated, and provide the necessary calcining power. And until this is done I decline to be responsible for the results obtained from the ore treated. I have made several assays of samples of stuff taken underground; but little reliance can be put on these, as to general mixed, as all the stuff contains some very rich and very poor stones. In reference to our conversation on the treatment of the pyritic and blende ores from the bottom of the Piqué Mine, I beg to state, as I then told you, that in my opinion all that quality ore must be concentrated on blankets and buddies, all calcined and treated in the arrastres; for if all the pyrites and blende are not caught and treated, we shall never do good duty with it, as the gold is so fine that it is impossible to stamp fine enough to free it all, and to enable us to concentrate to a high degree. An average sample of main lode, within a few feet of the bottom of the mine. Sample taken underground, assayed 1 oz. 6 dwt. 3 grs. for gold, and 2.02, 5 dwt. 17 grs. for silver; a sample from run, 2 ozs. 3 dwt. 11 grs. for gold, and 1 oz. for silver; a sample from bottom of run, 9 dwt. 18 grs. for gold, and 4 dwt. for silver; a sample of stone of rich earthy iron ore, broken within a few feet of the bottom of the mine, 2 ozs. 18 dwt. 19 grs. for gold, and 19 dwt. 14 grs. for silver; a sample from back of 44 north, 2 ozs. 9 dwt. for gold, and 2 ozs. 9 dwt. for silver; a sample of stone of fine grained steel looking pyrites from the bottom of Piqué, 6 dwt. 15 grs. for gold; a sample of stone of rough pyrites from the bottom of Piqué, 3 ozs. 2 dwt. 1 gr. for gold, and 1 oz. 8 dwt. 18 grs. for silver; a fair sample of a pile of auriferous pyrites and blende from the bottom of Piqué, 2 ozs. 15 dwt. 15 grs. for gold, and 2 ozs. 2 dwt. 11 grs. for silver.

EXCHERQUE (Gold and Silver).—Lewis Chalmers, Oct. 9: During the week ended Saturday the east cross-cut from the shaft in the 400 was in 49½ ft., and just into the casing of the lode. The north drift in the 300 is in 263 ft. from shaft—some fine ore in the face. Nos. 1 and 2 slopes, in the 200 ft. level, are looking well. No. 2 slope is all timbered up, which prevented our getting out so much ore as usual last week—only 27 tons. The 140 is also looking well. The engine-house is progressing. At the mill I have got up the last of my freight, except two new retorts and additional dry kiln-plates. The engine-shaft, with various driving machinery, cam-shafts, and rollers, were got in on Saturday. The heavy fly-wheel goes on to day; pump and heater connections all but completed; chimney heightened 25 ft.; driving machinery of furnace to go in this week.

I. X. L. (Gold and Silver).—Lewis Chalmers, Oct. 9: The north drift, at the 200, was pushed ahead 20 ft. last week, and is now in 231 ft. in fair working ground and good vein matter. The south drift from the lower tunnel is in 19 ft. from the main track. We have good ore in the face and back. Great progress is being made at the mill. The whole machinery of the mill has been shipped.

SANTA BARBARA.—Mr. Hilleke, Sept. 26: Mr. Hilleke reports that during the past fortnight the lode at the different points wrought on showed no alteration of consequence, and its yield, judging from the amalgam so far obtained, would be similar to that of the previous month. The output of ore would not, however, be as large as in August, owing to a number of the borers being absent through sickness, which was very prevalent in the neighbourhood. The planting season being made it additionally difficult to procure more force, and the construction of the Dom Pedro II. Railway continued to draw a great number of labourers of all sorts down the country.

FRONTINO AND BOLIVIA (South American).—ANTIOQUIA (Frontino).—J. Jameson Truran (secretary), Nov. 2: Owing to the political disturbances which have occurred in the States of Colombia the usual advice from the mines have not yet reached the directors. The subjoined letter has been received from Mr. Robert White, and from it and other sources the directors do not anticipate that the revolution will be of long duration, and they are assured that the company's property and the produce of it will not be interfered with except by the delay which will be caused by the abstraction of a portion of the miners under the conscription law.

Robert B. White (Rionegro), Sept. 8: A foreigner passing through here to-night, and who goes on early to-morrow, promises to try to send this to the coast. I give you, therefore, a brief notice on your mines.—Antioquia: I returned from Frontino on the 4th inst. We lost 16 men by conscription, but had 49 left, and an order from the prefect, which I obtained, not to molest us further. I stopped work on Escobar, as it was too much of a dead pull in such an unfavourable time. End of No. 2 looking well and rich, but 7 fms. of backs is too little to pay right off where the end is so hard for driving. Polanco Old Mine opening out well. Lode powerful, and yielding the rate of from 15 to 20 cents per diem. This will pay, and is improving. The cross-cut south, from addit to Escobar, goes well, and we are undoubtedly touching the Escobar formation. Strings of mineral with the right direction and underlie are being cut, and water is coming out of forebore. Country hard, but favourable and kindly for mineral. We have great hopes here. Messrs. Restrepo and Sons are satisfied with arrangements and prospects. Cannot say what the results for July are, as post has not come up. I was delayed in Antioquia arranging matters with the prefect.—Bolivia: Mr. Barreneche came up on August 16. Had lost nearly all his men by conscription, and had only some 40 in all. Had been able and hoped to continue to keep the Palmichala in fork. Had secured to a great extent that mine, and hoped no damage would occur. He brought up 18 lbs. of gold. Cecilia and Tigre rich. The end of the Palmichala level had improved, and was very handsome looking and rich. Whenever my brother can get a man on to the Silencio pumps he does so, and we hope yet to get them, and shall make every effort to put them up. I shall go down if necessary. Under the present circumstances I shall devote my time to your mines. I have my wife here for change, and will remain in Medellin to-morrow, when I hope for news from Mr. Barreneche. We are afraid the Palmichala engine is on the coast, but it may have got up to Tarazona. We are completely blocked, but the Conservative (the revolutionary) party is losing ground, and I think and hope will soon be worsted.

CAPE COPPER.—Despatches per Edinburgh Castle: Capt. Tonkin writes, on Sept. 30: The 89 east is looking very well, worth at present fully 5 tons per fathom; the slope in the same level is yielding a large quantity of rich quality stuff. The 63 east is not producing ore enough to value, but the south drivings are opening out a good width of productive ground, and the mine altogether is looking well. In the dressing department we have got on rather slowly during the past month, on account of the scarcity of labour. Spectral Mill is very poor, and the slopes will no longer pay for working; and by the next mail I intend to send plans to show the trials we have already carried out, as well as the further explorations I think should be made before the place is finally abandoned. Despatches per European: The Trial Mines report is received. It shows no change of importance. Capt. Tonkin writes of Ookiep: The 80 east has improved, and it is now worth 3 tons of rich copper ore per fathom. The slope in the same level is looking very well indeed. The small bunch of ore north from shaft is not opening out very rich; but it has a very promising appearance, and the productive ground is widest in the bottom of the Elia, Diadem, and Spectral Mill. The load together about 1200 tons, have arrived at Port Nolloth: 690 tons of ore were sold by public ticketing on Oct. 24, at an average of 15s. 4d. per unit, realising, approximately, 13,900l.: 690 tons of ore have been put forward for sale on Nov. 7.

LA MANCHE.—J. Nancarrow, Oct. 2: In sending you my report I am glad to say the slope in the 20, west of Cooper's shaft, looks as well to-day as I ever saw it, and will produce fully 3 tons of lead per fathom, and I think from present appearances it will further improve, but the lode is harder and more spare for progress than any other part of the mine. This slope is now 11 fms. long, and lead still shows itself in the western end. No. 1 slope in the 20, west of McCoy's winze, maintains its former value—4 tons of lead per fathom, as stated in my intermediate or special report of the 26th ult. No. 2 slope in this level, to the east of the winze, is not looking so well to-day as reported last, owing to the lode being squeezed up in the form of a wedge by a hard country rock, but in a few feet in height and length it will open again, which can be seen, and I hope it will then resume its former value. I have not yet been able to get any additional miners, but with our present force I am keeping away the lead work as broken by the miners, so as not to impede them—wheeling, filling, landing, and dressing, in regular operation, and we have an abundant supply of water for all purposes, and the machinery in good order. All the lead possible shall be sent away as the season closes. **LUSTITIA.**—Oct. 24: At Taylor's engine-shaft, below the 190, the lode is 7 ft. wide, composed of quartz and some stones of ore. The water is boiling up in the country by a wall in the north side of the shaft, and is very warm. In winze No. 104, below the 170 west of Taylor's, on 31st of lode, the lode is worth 1 ton of ore per fathom. The 180, east of Taylor's, is idle just now; the lode is 6 ft. wide, of quartz. In the 50 cross-cut, north of Perez' shaft, the ground is rather better for driving through. The lode in the 190, west of Taylor's, has improved, and is now yielding 2 tons of ore per fathom. In the 180, west of the slide, the lode is worth 1 ton per fathom. In the 170, west of Taylor's, the lode is 3 ft. wide, composed of quartz and some stones of ore. In the 160, east of River shaft, the lode is 2 ft. wide, of soft and hard quartz. The lode in the 150, west of the slide, has considerably improved, and is now worth 1 ton per fathom. East of River shaft, in the 110 west of the cross-cut, the lode is about 1 ft. wide, of country and flookan. The 50, east of this shaft, is worth ½ ton per fathom. In the 23, east of River shaft, the lode is in several strings, of no value. The lode in winze No. 103 below the 70, east of River shaft, is worth ½ ton per fathom of copper and cobalt ores, and in the rise above the 90, going up to meet it, the lode is worth ½ ton per fathom. **Carrizal:** In the 60 west of cross-cut, south of incline shaft, the lode is 8 in. wide, composed of quartz and small spots of lead and mundie. In the 30 north of

great lode, west of incline shaft, the lode is 6 in. wide, composed of quartz spotted with lead and blende, also stones of mundie.

RICHMOND CONSOLIDATED—TOO MUCH ORE.—It is something hitherto unheard of for a mine to be troubled with too much ore, but such is really the case with the Richmond Company in this district. They are capable of producing 300 tons of ore a day, if the furnaces could reduce that quantity, but as that amount is beyond the smelting capacity of the furnaces, the ore has accumulated till it has come to be a sort of welcome nuisance. The mine and dumps are full to overflowing, and the company have been obliged to discharge a number of miners on this account, and the mine will be shut down during to-day in order to give the teams a chance to reduce the dumps. Mr. Potts, the foreman, to whom we are indebted for the above facts, informs us that unless means are taken to discharge still more men. It is not often that an increased production of ore from a mine results in the discharge of miners, and for their sakes it could almost be wished that the company did not have quite so much ore. This trouble is only temporary, however, and will soon be remedied, when the usual working force will be again employed.—*Essex Daily Standard* (Oct. 6).

EBERHARDT AND AURORA SILVER MINE.—The tunnel in this mine is completed to a distance of 200 ft., two shifts of men being employed. When the machinery and dri are set in motion, it is thought that not less than from 5 ft. to 7 ft. of tunnel will be made every 24 hours. We are informed that very favourable indications for veins of ore have already been struck in the tunnel, in the way of a number of feeders that probably attach to some vein. The company is also sinking an incline shaft, which has now attained a depth of 342 ft., and the indications are said to be very encouraging for striking ore. It is doing a large amount of dead work, and are employing more men than at any time within the last three years. The company, during its last run of 36 days, turned out considerable amount to \$10,000. We presume the mine will produce more than one-half of this amount is clear profit. During this run there were 200 tons of the lowest grade ore put through the mill.—*White Pine News* (Oct. 7).

Californian papers state that the bullion yield of the Californian and Consolidated Virginia Mines in September amounted to \$2,156,813, and making due allowance for the ordinary proportion of gold produced, it leaves in round figures an out-turn of about a quarter of a million of silver. After what is sometimes said of the falling off in the supply, this can hardly be deemed a small yield, and as recent events show, plenty of the metal is forthcoming for export to this side directly the price exhibits anything like firmness.

ESGAIR FRAITH MINE—SPECIAL REPORT.

Sept. 30.—This mine lies to the east of the village of Talybont about 7 miles, and distant from the Llanthangel Railway Station about 8 miles. The vein is of great size, varying from 30 to 60 ft. wide, and in this grant, and immediately to the west of it, has produced millions of pounds worth of silver-lead and copper ores. The mine is well supplied with powerful water-wheels, each for the purposes of pumping, crushing, drawing, and dressing; for the latter purposes the machinery is perfect and complete, consisting of patent jiggers, &c., of the most approved construction, and all of which, with the buildings and connections, could not have been erected for a less sum than 5000l. There is also a good miners' barracks and work, which can be accomplished at a less cost than if the men had to travel a great distance to and from their work daily. The ground from the west end towards Esclair Fraith falls rapidly for nearly ¼ mile, so that the machinery is fixed in a well-sheltered spot, and is well supplied with surface water at all seasons of the year. Although immense quantities of ore have been returned from this mine, the deepest of the workings have only reached a point of 10 fms. under the adit level, the component parts of the lode being a very rich gossan, with carbonate of lead, and very rich copper ore, peacock, horsehair, and yellow or copper pyrites, which have been sold for as much as 25s. 10s. per ton. This gossan is a rare find, and there is as little doubt on my mind that before the copper gives way to lead, or covers, an immense mass or body of lead ore I have no doubt whatever, but that tens of thousands of tons of the former will be raised, and that the copper will gradually subside and be taken place by the lead, as is the case in the deepest mines of Cornwall—they making copper near the surface, which gives way to lead ore in depth. As there is a splendid field of machinery for the mine already for its immediate development, with rich copper ground to start the sinking of the present engine-shaft on (the slide being now filled with the ore stuff broken therefrom), and from the backs over the 10 ft. level, it will not take a very large capital to lay open ore ground enough to bring the mine into a state of good returns and profits. I should, however, strongly advise the opening out of a sufficiently large quantity of ore ground for maintaining the returns and profits of the mine for at least two years before commencing to stop away the reserves, but the ore broken from the sinking of the shaft, the driving of the level, and the sinking of winzes for ventilation, should be returned, and made marketable at the time it is broken and raised from the different bargains. I would, therefore, advise the carrying out of the following work:—

To sink the engine-shaft from the 10 to the 20 ft. level, leaving a clear back of 10 fms.—say, 11 fms. at 30l. per fathom, including costs and materials of all kinds, or	2330
Drive the 10 ft. level west 50 fms., at 10l.	500
Drive the 10 ft. level east 50 fms., at 8l.	400
Drive the 20 ft. level west 30 fms., at 10l.	300
Drive the 20 ft. level east 30 fms., at 8l.	240
Sink a winze under the 10 west to 20—11 fms., at 12l.	132
Sink a winze under the 10 east to 20—11 fms., at 12l.	132
Sink shaft from 20 to 30—11 fms., at 30l.	330
Total	4234

If this is done it will cost 2884l., to which should be added a further sum for offices, smithy, and carpenters' shop, 300l.; and for the extension of surface machinery 334l., a total cost of 3000l. I believe this work would lay open a sufficient quantity of ore to commence returns of 1000l. per month, which would have a profit of 5000l. per year, and which I believe would go on increasing from year to year for the term of the lease. It is impossible to select a finer property for investment, neither would I venture to predict as to the ultimate quantity of ore that will eventually be raised from it, but there is no reason to believe otherwise than that it will stand second to no mine opened or worked in Cardiganshire. The grant is very extensive and the royalty moderate, being 1-10th, and roads good for carriage of ore.—*Gwynedd, Llanidloes*. **ABRAHAM FRANKS.**

PROPOSED MINING EXCHANGE.—We are glad to be able to state that through the untiring exertions of Capt. W. Teague, jun., and Mr. T. B. Provis, of Camborne, there is every probability of the establishment of a Mining Exchange for mine agents and others interested in the working of Cornish mines. We hear that the proposal has been most favourably received by many gentlemen, both in and out of the county, who are largely interested in Cornish mining. It is stated that among the objects of the Exchange will be included free discussions on mining machinery, explosives, different modes of working, &c. The Exchange, it is thought, might also serve as a board before which inventors might bring their inventions to learn their chances of success in Cornish mines, and would thus be of great use to them. The want of such an institution has long been felt, and an establishment of this character was advocated some time ago in our columns by Capt. W. Teague, jun., and we now wish him and Mr. Provis full success in their undertaking.

SALES OF MINES SHARES.—At the sale by auction of the property of the late Mr. C. B. Bone, who was cashier to Messrs. Mason and Elkington, copper smelters, which took place on Monday, at the Druid's Hall, Redruth, some shares in mines sold well. The following were the prices realised:—Whale Unity at 17s. 6d., Cully Wood at 4s., West Pollice at 11s., West Tolgas at 61s. 10s., South Carn Brea at 5s., Wheel Peever at 11s., South Crofty at 12s., and New Cook's Kitchen at 1s. **DOLCOATH.**—It is now three years since the splendid bunch of tin was found deep down in the mine. Since then Dolcoath has yielded 100 tons of tin monthly. The mine is 20 fms. below where the rich ore was discovered, and levels have been driven into the deposit. As yet not much of the ground is taken away, and it is said that Dolcoath can reckon on returning 100 tons of tin a month for the next six years. Whatever may be the work of the boring machine in fair ground the economic value for hard ground seems established here.—*West Briton*.

CORNISH PUMPING ENGINES.—The number of pumping-engines reported for Oct. 17. They have consumed 1602 tons of coal, and lifted 11,500,000 tons of water 10 fms. high. The average duty of the whole is, therefore, 48,600,000 lbs., lifted 1 ft. high, by the consumption of 112 lbs. of coal. The following engines have exceeded the average duty:—

Mellanear—75 in.	Millions	49.3
West Wheel Francis—58 in.		49.2
West Tolgas—Richard's 70 in.		49.3
West Wheel Seton—Harvey's 85 in.		48.7
Ditto	—Rule's 70 in.	48.1
Wheel Unity Wood—70 in.		47.7

WELSH STEAM COAL COLLIERIES.—The liquidator (Mr. H. Wilson, Bartholomew House, Bank) has declared a first dividend of 3s. 4d. in 1l. to the creditors of this company.

HOLLOWAY'S PILLS AND OINTMENT.—When the summer's heat first becomes sensible the liver is very apt to become temporarily irritated, congested, and deranged. This is in itself a very common cause of dangerous disease if it is not at once corrected by appropriate treatment. Holloway's Ointment rubbed into the region of the liver (under the right breast) acts like a charm in this respect, aided and assisted by the alterative properties of the Pills, which must be taken at the same time internally; pure and healthy bile is then poured out by the liver, and nature being aided, not counteracted, the symptoms are not only temporarily removed but are permanently eradicated. Much comfort will be produced by these remedies.

J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, AND RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES, NAILS, FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY AND MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions. STOURBRIDGE FIRE BRICKS AND CLAY.

BLAKE'S PATENT STEAM PUMP.

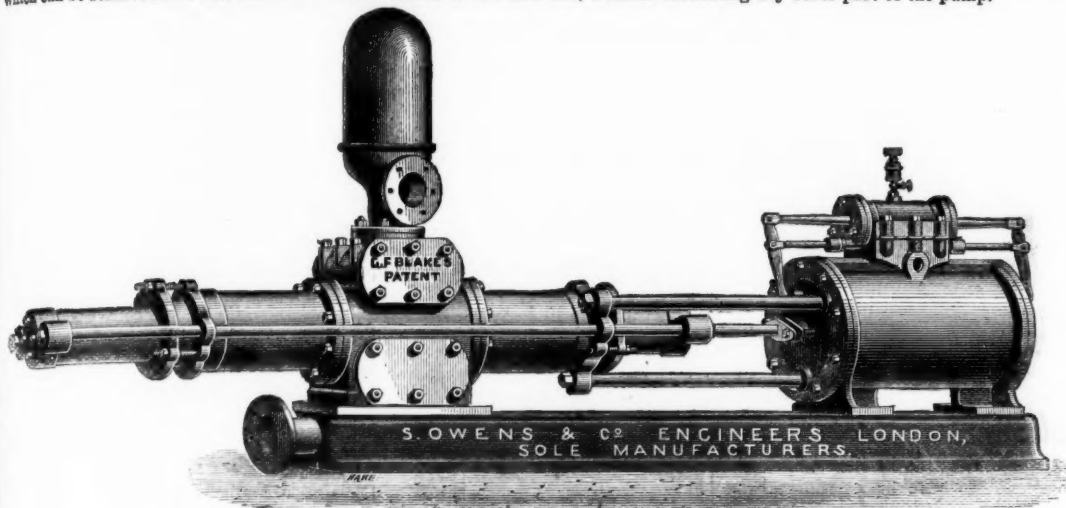
MORE THAN 10,000 IN USE.

SOLE MAKERS FOR GREAT BRITAIN.

S. OWENS & CO.,

Hydraulic and General Engineers, Whitefriars-street, London;
And at 195, Buchanan-street, Glasgow (W. HUME, AGENT).

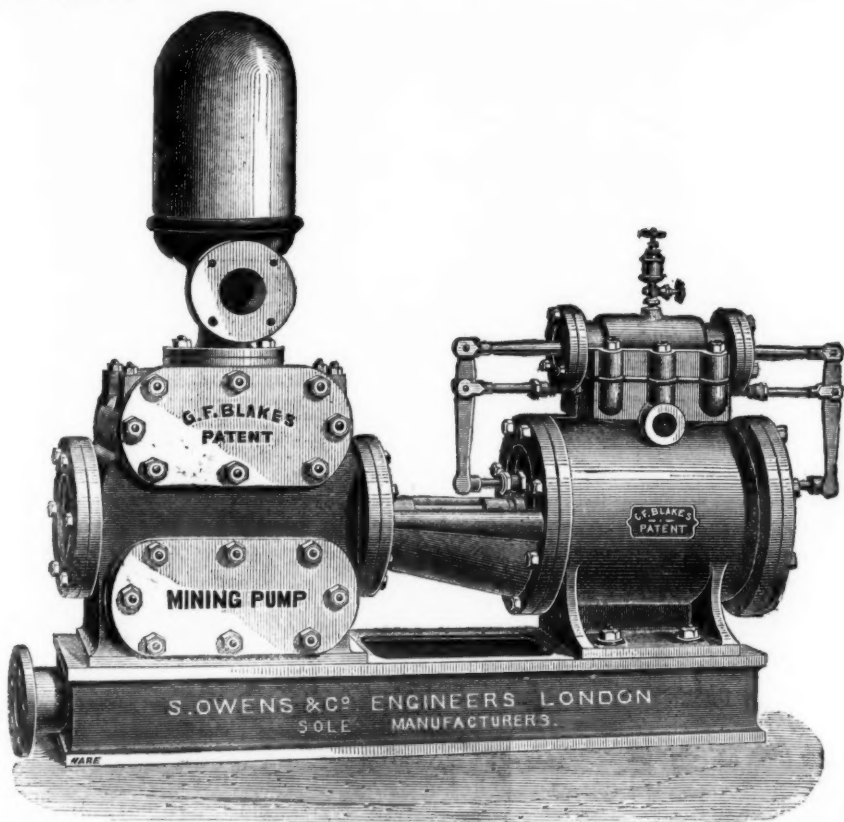
These PUMPS from their SIMPLICITY, RELIABILITY, DURABILITY, and ECONOMY are SPECIALLY SUITED FOR MINING PURPOSES, where large quantities of water require to be raised from great or medium depths with CERTAINTY. They are double-action in their construction, throwing a constant stream of water, can be made of any stroke to suit the space in which they have to work, can be arranged with any combination of steam and water cylinders to suit the pressure and lift against which it is desired to work them, are made of the very best materials and highest class of workmanship, and all working parts can be readily got at by any ordinary workman, and replaced if necessary by a duplicate part (all such being interchangeable) in the shortest possible time. For situations where gritty and sandy water has to be pumped the DOUBLE-PLUNGER PATTERN is recommended. Where space is limited the PISTON PUMP is better suited, a novel feature of which is the PATENT REMOVEABLE LINING, which can be removed in a few minutes and substituted with a new one, without disturbing any other part of the pump.



Blake's Improved Double-plunger Steam Pump.

S. OWENS AND CO.,

In placing the BLAKE STEAM PUMP before the mining world, believe they are offering the BEST, MOST RELIABLE, and ECONOMICAL PUMP that has yet been made, and solicit an inspection of various sizes in operation at their works, Whitefriars-street, Fleet-street, London.



Blake's Improved Mining Pump, with Patent Removeable Lining to Pump Cylinder,

Any combination of these Pumps may be had to suit circumstances. The following are some of the SIZES SUITABLE FOR MINING PURPOSES:-

Size of steam cylinders.. In.	12	12	12	12	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	24	24
Size of water cylinders.. In.	3	4	5	6	4	5	6	4	5	6	8	4	5	6	8	5	7	8	9	6	8
Length of stroke..... In.	18	18	18	24	24	24	24	24	24	24	24	24	30	30	30	30	30	36	36	36	42
No. of strokes per minute..	30	30	30	30	25	25	25	22	22	22	22	22	22	22	22	20	20	17	17	17	15
Quantity in gallons per hour, approximately ...	1440	2610	4200	5940	2940	4620	6600	2646	4158	5940	10620	2646	5160	7500	13260	4586	9000	12360	15660	6720	12000

PRICES FOR THE ABOVE, OR ANY SPECIAL SIZE, AND ILLUSTRATED CATALOGUES FURNISHED ON APPLICATION.

PATENT CONDENSERS

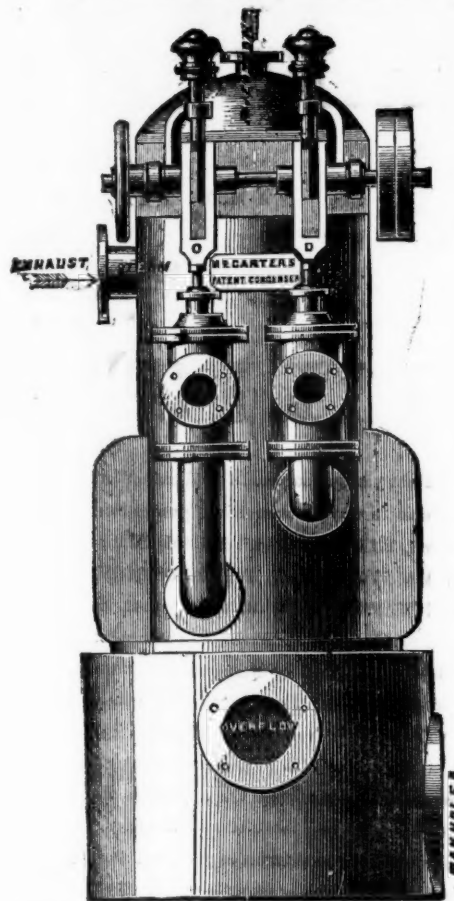
Can be supplied for any size pump to effect a saving of fully 30 per cent. in the consumption of fuel, greatly increasing their efficiency

The Blake Pump will work under water, and as efficiently with compressed air as with steam.

BLAKE'S DONKEY PUMPS FOR FEEDING BOILERS KEPT IN STOCK.

LICENSED MAKERS.

KIRK, RAMSDEN, AND CO.
(LIMITED),
HUDDERSFIELD.



These Condensers can be placed inside or outside of the engine-house. They draw their own injection water, and require no foundation. Specially adapted to Pumping and Winding Engines, effecting a saving from 20 to 30 per cent. in coal, and increases the power of the Engine.

Engineers, Millwrights, Founders,
AND
FORGE PROPRIETORS.

Makers of Pumping, Winding, and Blowing Engines,
Condensing and Non-condensing.
Horizontal and Beam Engines for all purposes.

BICKFORD'S PATENT
FOR CONVEYING
CHARGE IN



SAFETY FUSE,
FIRE TO THE
BLASTING ROCKS, &c

Obtained the PRIZE MEDALS at the "ROYAL EXHIBITION" of 1861; at the "INTERNATIONAL EXHIBITION" of 1862 and 1874, in London; at the "IMPERIAL EXHIBITION," held in Paris, in 1855; at the "INTERNATIONAL EXHIBITION," in Dublin, 1865; at the "UNIVERSAL EXHIBITION," in Paris, 1867; at the "GREAT INDUSTRIAL EXHIBITION," at Altona, in 1869; TWO MEDALS at the "UNIVERSAL EXHIBITION," Vienna, in 1873; and at the "EXPOSICION NACIONAL ARGENTINA," Cordova, South America, 1872.



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of TUCKINGMILL, CORNWALL; ADELPHI
BANK CHAMBERS, SOUTH JOHN-STREET, LIVER-
POOL; and 85, GRACECHURCH-STREET, LONDON,
E.C., MANUFACTURERS AND ORIGINAL
PATENTEE'S OF SAFETY-FUSE, having been in-
formed that the name of their firm has been attached to
fuse not of their manufacture, beg to call the attention of
the trade and public to the following announcement:-
EVERY COIL of FUSE MANUFACTURED by them has TWO SEPARATE
THREADS PASSING THROUGH the COLUMN of GUNPOWDER, and BICK-
FORD, SMITH, AND CO. CLAIM SUCH TWO SEPARATE THREADS as
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MANUFACTURERS OF EVERY DESCRIPTION OF
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PATENT FLAT AND ROUND WIRE ROPES
from the very best quality of charcoal iron and steel wire.

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DUCTORS, STEAM PLOUGH ROPES (made from Wedgwood and Horsfall's
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BLASTING FUSE FOR MINING AND ENGINEERING
PURPOSES.

Suitable for wet or dry ground, and effective in Tropical or Polar Climates.

W. BENNETTS, having had many years experience as chief engineer with
Messrs. Bickford, Smith, and Co., is now enabled to offer Fuse of every variety of
his own manufacture, of best quality, and at moderate prices.
Price Lists and Sample Cards may be had on application at the above address.
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MAY BE USED WITH CONFIDENCE by persons suffering
from headache, indigestion, bilious ailments, scorbutic complaints, affec-
tions of the nervous system, lowness of spirits, restlessness and bad dreams, &c.
Sold by all chemists.



PARIS EXHIBITION, 1867.



VIENNA EXHIBITION, 1873.



LONDON EXHIBITION, 1874.



CORNWALL POLYTECHNIC SOCIETY, 1867 and 1873.

TANGYE BROTHERS AND HOLMAN,

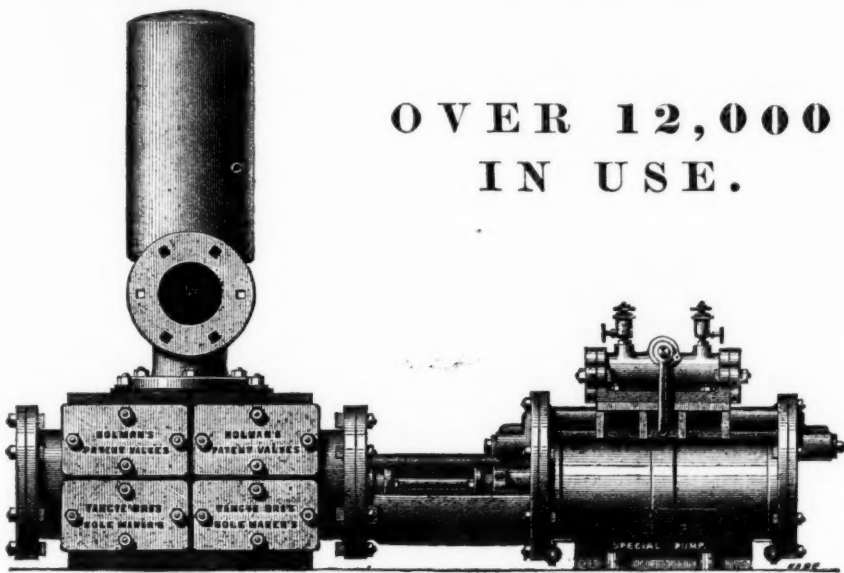
10, LAURENCE POUNTNEY LANE, LONDON, E.C.,

AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO

FOR

"THE SPECIAL" DIRECT-ACTING STEAM PUMP.

After eight years of successful application for all purposes to which steam-driven pumps can be applied, THE "SPECIAL" STEAM PUMP STILL MAINTAINS THE FIRST POSITION IN THE MARKET, notwithstanding that it alone—of all direct-acting pumps—has been subjected to the great variety of severe tests that must be encountered in such a period of time. Some valuable improvements have been suggested in the course of a long experience, and their adoption has rendered the apparatus at once the simplest and most certain in action. There is absolutely no extraneous gear, and the steam cylinder is no longer than the pump. The valves are of easy access, and are suited for pumping fluids and semi-fluids of almost any consistency.



OVER 12,000 IN USE.

WILLIAM ELLIOT, Esq., of the Weardale Iron and Coal Company, writes under date Sept. 17th, 1875, as follows:—"We have now THIRTY-FIVE of your SPECIAL STEAM PUMPS in operation at the various collieries under my charge—some of them employed pumping water out of our pits to the depth of 50 fms.—others employed in the pits, and a good many feeding Boilers. I have no hesitation in saying that we have found them the Cheapest and Best Pumps of the kind we have tried. I can with confidence recommend them to intending purchasers."

Messrs. BURT, BOULTON, and HAYWOOD, Chemical Manufacturers, of London, have also THIRTY-EIGHT of the "SPECIAL" STEAM PUMPS in use at their works, and continue to order more.

GREAT REDUCTION IN PRICES.

The following sizes are suitable for low and medium lifts:—

Diameter of Steam Cylinder ...In.	3	4	4	4	5	5	5	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10			
Diameter of Water Cylinder ...In.	1½	2	3	4	3	4	5	3	4	5	6	3	4	5	6	7	4	5	6	7	8	5	6	7	8	9	5	6			
Length of StrokeIn.	9	9	9	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	18	12	12	12	18	24	12	12			
Gallons per hour	680	815	1830	3250	1830	3250	5070	1830	3250	5070	7330	1830	3250	5070	7330	9750	3250	5070	7330	9750	13,000	5070	7330	9750	13,000	16,519	5070	7330			
Price	£ 16	18	20	25	22	10	27	10	32	10	25	30	35	40	30	35	40	45	50	40	45	50	55	65	50	55	60	70	85	55	60

CONTINUED.

Diameter of Steam Cylinder..In.	10	10	10	10	12	12	12	12	12	12	14	14	14	14	14	14	16	16	16	16	16	18	18	18	18
Diameter of Water Cylinder..In.	7	8	9	10	6	7	8	9	10	12	7	8	9	10	12	14	8	9	10	12	14	9	10	12	14
Length of StrokeIn.	12	18	24	24	18	18	18	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Gallons per hour	9750	13,000	16,519	20,000	7330	9750	13,000	16,519	20,000	30,000	9750	13,000	16,519	20,000	30,000	40,000	13,000	16,519	20,000	30,000	40,000	16,519	20,000	30,000	40,000
Price	£ 55	75	90	100	75	80	85	110	120	140	110	120	130	140	160	180	140	150	160	180	200	180	190	210	230

Intending purchasers of Steam Pumps would do well to observe the great length of stroke, short steam cylinder, and short piston of the "Special" Steam Pump, as compared with the short stroke, long steam cylinder, and long piston of the Pumps of other makers, as the efficiency and durability of the machine, and the space occupied by same, greatly depend upon this. The advantage of long strokes will be obvious when purchasers are reminded that each set of suction and delivery valves of a "Special" Steam Pump with 24 in. stroke, running at 120 ft. per minute, would open and close only 30 times per minute, as against 120 times per minute in a Pump with only 6 in. stroke performing same duty.

The "Special" Steam Pump can be worked by Compressed Air as well as by Steam.

HUNDREDS of these PUMPS are USED for HIGH LIFTS IN MINES, for which purpose they are made with 21, 24, 26, 28, 30, and 32-inch Steam Cylinders, and 36 48 and 72-inch Strokes.

Holman's Patent Self-acting Exhaust Steam Condensers,

FOR ALL KINDS OF STEAM PUMPS AND HIGH-PRESSURE STEAM ENGINES.

Turns waste steam into GREAT POWER.

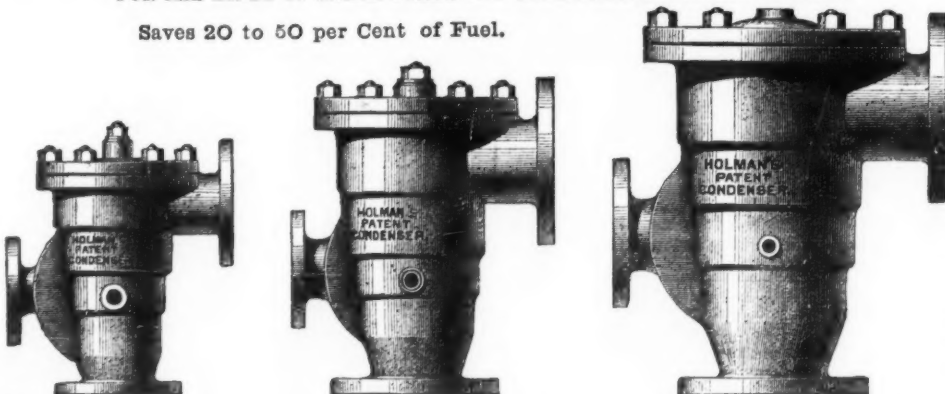
Saves 20 to 50 per Cent of Fuel.

REQUIRES NO THREE-WAY COCKS, CHECK, or REGULATING VALVES.

SAVES HALF ITS COST IN PIPES AND CONNECTIONS.

PREVENTS ALL ESCAPE OF STEAM IN MINES OR ELSEWHERE.

REQUIRES NO EXTRA SPACE.



These Condensers are made to suit any size and kind of Steam Pump. They form a part of the suction pipe of the Pump, and while they effectually condense the exhaust steam they produce an average vacuum of 10 lbs. per square inch on the steam piston, increasing the duty of the Engine, and effecting a saving in fuel of from 20 to 50 per cent.

In Mining operations these Condensers will be of great value.

All Boiler Feeders are recommended to be fitted with these Condensers, as not only is the exhaust steam utilised in heating the feed water, but is returned with it into the boiler.

The following Testimonial gives one Example of the Power Gained by the action of Holman's Patent Condensers:—

MORLEY COLLIERY, WIGAN, October 16th, 1874.

Messrs. TANGYE BROTHERS AND HOLMAN.

GENTLEMEN,—I have great pleasure in recording my entire satisfaction with the working of the Holman's Patent Steam Pump Condenser which you have supplied to us. The complete condensation of the steam is, apart from its value in the strict economical sense, a most valuable feature in the drainage of underground work-

ings. The perfect manner in which this important result is accomplished by your Condenser is extremely creditable to you, and merits the thanks and commendation of the Mining Engineer. When we start the "Special" Steam Pump the Condenser commences working automatically, and maintains a constant vacuum of 10½ lbs. per square inch, even when we run the Pump upwards of 80 strokes (106 feet) per minute. It may perhaps be interesting to you to know that when we were running the Pump at 84 strokes (168 feet) per minute, the steam gauge

indicating a steam pressure of 36 lbs. per square inch, 80 yards from the Pump and the Condenser vacuum gauge on the exhaust pipe indicating a steady vacuum of 21½ inches, I turned the exhaust steam from the Condenser into the atmosphere, when the speed at once fell to 44 strokes per minute. The economy thus shown is really so great that the cost of the Condenser must be recovered in a very short time. (Signed) J. THOMPSON.

from 30s. to 40s. per inch diameter of Steam Cylinder, according to the relative Diameter of Pump for which Condenser is required.

NORTH OF ENGLAND HOUSE ... TANGYE BROTHERS AND RAKE, ST. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.
SOUTH WALES HOUSE... TANGYE BROTHERS AND STEEL, Tredegar Place, NEWPORT, Mon.; and Oxford Buildings, SWANSEA.

PATENT IMPROVED ORE WASHING & DRESSING MACHINES.

THE SANDYCROFT FOUNDRY & ENGINE WORKS CO. (LIMITED), NEAR CHESTER

LATE THE MOLD FOUNDRY CO. (ESTABLISHED 1838).

SOLE MAKERS IN GREAT BRITAIN.

HUNDREDS IN USE.

FULL PARTICULARS,
PHOTOGRAPHS, TESTIMONIALS, AND PRICES,
UPON APPLICATION.

Will supply Designs, and all the necessary Plant for laying out
Dressing Floors; also

MANUFACTURERS OF EVERY VARIETY OF

MINING MACHINERY.

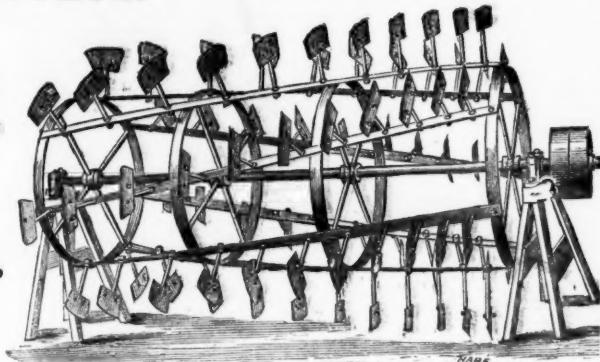
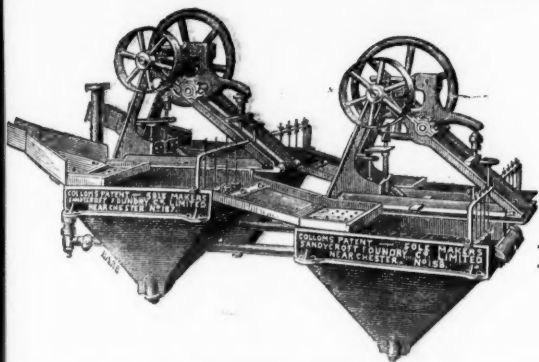
PUMPING & WINDING ENGINES,

PITWORK, CRUSHING MILLS,

ROLLS

OF PECULIARLY HARD AND TOUGH MIXTURE

&c., &c.



COLLON'S PATENT AUTOMATIC ORE WASHING MACHINE, working at the following and
many other Lead, Copper, Blende, and Tin Mines:—Great Laxey, Cape Copper, Pontgibaud, Linares, Ala-
millon, West Tolgus, Lisburne, Minera Halvans, Snailbeach, &c.; and also at Messrs. Vivian and Sons'
Works, Swansea.

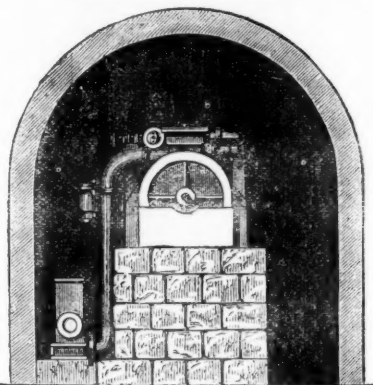
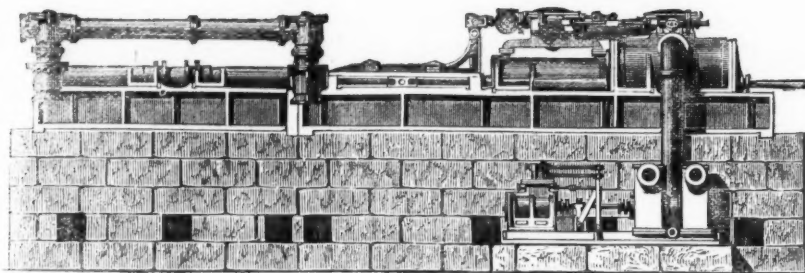
PATENT IMPELLER, OR KNIFE BUDDLE, in use at the following and many other Lead,
Copper, Blende, and Tin Mines:—The Van, Roman Gravels, Tankerville, Ladywell, Lisburne, East
Black Craig, Old Treburgett, Penhale & Barton, Bog, Linares, Fortuna, Alamillos, Minera Halvans, &c.

LONDON OFFICE: 6, QUEEN STREET PLACE, E.C.

HATHORN, DAVIS, CAMPBELL, AND DAVEY,

MAKERS OF

The Differential Pumping Engine, Hydraulic Pumping Engines, Cornish Engines, Differential
Blowing Engines, Compound Rotative Engines, the Separate Condenser, Hydraulic Machinery,
Mining Plant of all kinds, and Machinery for Water Supply, Irrigation, &c.

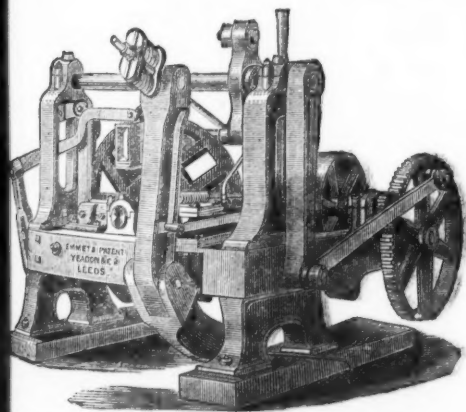


THE COMPOUND DIFFERENTIAL ENGINE AND FORCE PUMPS,

With Separate Condenser, as applied Underground, forcing 700 gallons per minute 920 feet high.

SUN FOUNDRY, LEEDS.

FURTHER PARTICULARS ON APPLICATION



EMMET'S A1 PATENT BRICK MACHINE.

Massive; durable; cheap; takes little power, and gives
PERFECT SATISFACTION.

This is the ONLY Machine which presses the Brick equally on
BOTH sides, each plunger entering the mould plate $\frac{3}{8}$ in., and
turning out 12,000 SQUARE, SOLID, PRESSED Bricks per day,
READY AT ONCE FOR THE KILN.

SOLE MAKERS—

YEADON AND CO.,

CROWN POINT FOUNDRY, LEEDS.

Makers of EVERY DESCRIPTION of Colliery and Brick Yard
Plant.

LONDON AGENTS—

HAUGHTON AND CO., No. 122, CANNON STREET, E.C.

CONTINENTAL AGENTS—

FLAMBECK AND DARKIN, 171, QUEEN VICTORIA ST., E.C.

ARTESIAN BORINGS,

For WATER SUPPLY to TOWNS, LAND IRRIGATION, and MINERAL EXPLORATIONS, may be executed of any diameter,
from 6 in. to 36 in., and to any depth to 2000 ft.,

Stons & Air-pump Buckets fitted with Patent Elastic Metallic Packing

of which upwards of 8684 have been made to March, 1875.

MATHER AND PLATT,

MAKERS OF LARGE PUMPS AND PUMPING ENGINES.

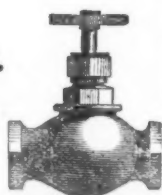
Improved Valves and Taps for Water, Steam, Gas, &c.

PATENT STEAM EARTH-BORING MACHINE

ENGINEERS and MACHINE MAKERS to CALICO PRINTERS, BLEACHERS, DYERS, and
FINISHERS.

SALFORD IRONWORKS, MANCHESTER.

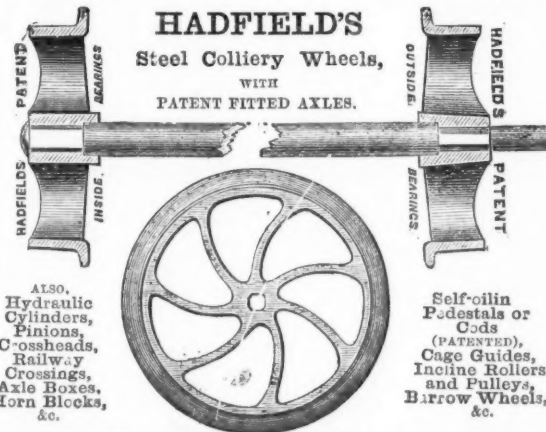
PRICES AND PARTICULARS ON APPLICATION.



TO COLLIERY PROPRIETORS, MINING ENGINEERS, &c.

HADFIELD'S

Steel Colliery Wheels,
WITH
PATENT FITTED AXLES.



ALSO,
Hydraulic
Cylinders,
Pinions,
Crossheads,
Railway
Crossings,
Axle Boxes,
Horn Blocks,
&c.

Self-oiling
Pedestals or
Cods
(PATENTED),
Cage Guides,
Incline Rollers
and Pulleys,
Barrow Wheels,
&c.

Hadfield's Steel Foundry Company,

MANUFACTURERS OF EVERY DESCRIPTION OF

CRUCIBLE CAST STEEL CASTINGS.

ATTERCLIFFE, SHEFFIELD.

THE NEWCASTLE DAILY CHRONICLE
(ESTABLISHED 1784.)
THE DAILY CHRONICLE AND NORTHERN COUNTIES ADVERTISER
Office, Westgate-road, Newcastle-upon-Tyne; 50, Howard street North
Shields; 195 High-street, Sunderland.

Just published, Free Edition.

GUIDE TO HEALTH; or, ADVICE AND INSTRUCTIONS FOR
THE CURE OF NERVOUS DEBILITY.—A New Medical Work on the
Treatment of Local Debility, Consumption, Loss of Memory, Physical Depression,
Indigestion, and all diseases resulting from loss of nerve power. Illustrated with
cases and testimonials. Sent free for two stamps.—Dr. SMITH will, for the benefit
of country patients, on receiving a description of their case, send a confidential
letter of advice.
Address, Dr. H. SMITH, 8, Burton-crescent London, W.C.

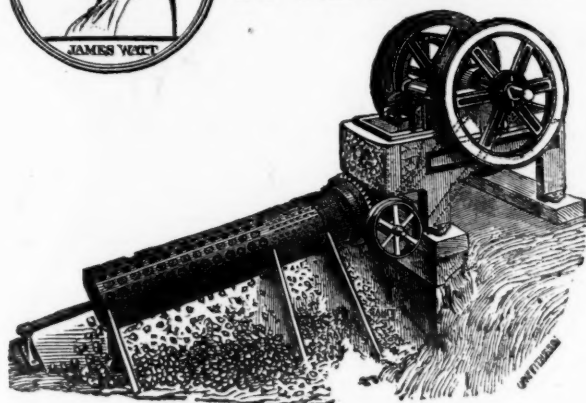
BUYERS are CAUTIONED against Purchasing any Infringements of H.R.M.'s Numerous PATENTS.



Ore Crushers, H. R. M.'s
New Patent Crushing Jaw
EXTENSIVELY USED
BY MINÉ OWNERS.

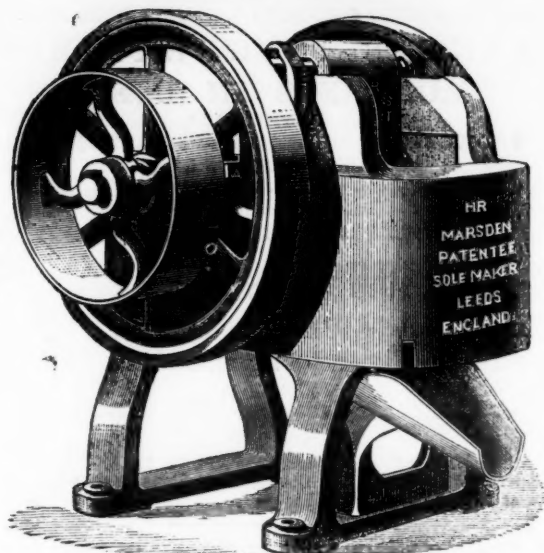
H. R. MARSDEN, LEEDS, Mining Improvements
ENGINEER.
Revolving Picking
Table.

1150 NOW IN USE.

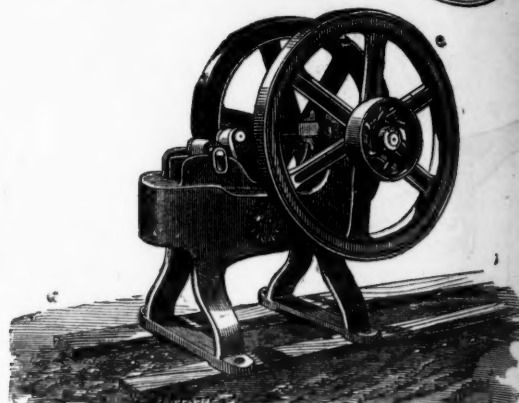


FIXED MACHINE AND SCREEN.

Specially designed and largely used for
rushing Pyrites, Limestone, Cement, Coal, Rocks, &c.,
AT ALL THE PRINCIPAL WORKS IN THE KINGDOM.
Takes in 20 in. by 9 in. and is shown by TESTIMONIALS to be
breaking from 1000 to 1200 tons per day of 10 hours, at
THREE HALF-PENCE PER TON.
FEW WORKING PARTS.
SMALL WEAR AND TEAR.
FREEDOM FROM BREAKAGE.



"The Machine is well designed, simple, but substantially made
and is capable of reducing any material to fine gravel, such as cop-
per ore, and is certainly preferable to the stamps in use for that
purpose."—Mining Journal.



MACHINE FOR HAND OR STEAM POWER.

For making gravel for gentlemen's walks in parks and gardens, also
for grinding emery, flints, fossils, &c., for pulverising silver, copper,
and other ores; also gold quartz, and especially useful to chemists
and metallurgists for sampling, as it is capable of pulverising the
hardest material, and can be turned by one man with ease.

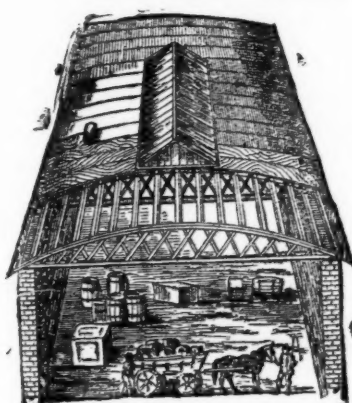
REFERENCES TO ALL PARTS OF THE WORLD.
SIMPLICITY OF CONSTRUCTION. EXCELLENCE OF SAMPLE.
ECONOMY OF POWER

THESE STONE BREAKERS AND ORE CRUSHERS ARE UNIVERSALLY PRONOUNCED THE ONLY PERFECT SUCCESS.

For Catalogues, Testimonials, &c., apply to the—

Sole Maker & Patentee, H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.

M'TEAR AND CO'S CIRCULAR FELT ROOFING,



FOR
GREAT ECONOMY
AND
CLEAR WIDE SPACE.
For particulars, estimates
and plans, address,—
M'TEAR & CO.,
ST. BENET CHAMBERS,
FENCHURCH STREET,
LONDON, E.C.;
4, PORTLAND STREET,
MANCHESTER;
OR
CORPORATION STREET,
BELFAST.

The above drawing shows the construction of this cheap and handsome roof, now
much used for covering factories, stores, sheds farm buildings, &c., the principal
of which are double bow and string girders of best pine timber, sheathed with 1/2 in.
boards, supported on the girders by purlins running longitudinally, the whole
being covered with patent waterproof roofing felt. These roofs so combine light-
ness with strength that they can be constructed up to 100 ft. span without centre
supports, thus not only affording a clear wide space, but effecting a great saving
both in the cost of roof and uprights.
They can be made with or without top-lights, ventilators, &c. Felt roofs of any
description executed in accordance with plans. Prices for plain roofs from 30s. to
60s. per square, according to span, size, and situation.
Manufacturers of PATENT FELTED SHEATHING, for covering ships' bot-
oms under copper or zinc.
DRY HAIR FELT, for deadening sound and for covering steam pipes, thereby
saving 25 per cent. in fuel by preventing the radiation of heat.
PATENT ASPHALTE ROOFING FELT, price 1d. per square foot.
Wholesale buyers and exporters allowed liberal discounts.
PATENT ROOFING VARNISH, in boxes from 3 gallons to any quantity re-
quired 8d. per gallon.



By a special method of preparation, this leather is made solid, perfectly close in
texture, and impermeable to water; it has, therefore, all the qualifications essen-
tial for pump buckets, and is the most durable material of which they can be made.
It may be had of all dealers in leather, and of—

I. AND T. HEPBURN AND SONS,
TANNERS AND CURRIERS, LEATHER MILLBAND AND HOSE PIPE
MANUFACTURERS,
LONG LANE, SOUTHWARK, LONDON
Prize Medals, 1851, 1855, 1862, for
MILL BANDS, HOSE, AND LEATHER FOR MACHINERY PURPOSES.

THE GREAT ADVERTISING MEDIUM FOR WALES.
THE SOUTH WALES EVENING TELEGRAM
(DAILY), and
SOUTH WALES GAZETTE
(WEEKLY), established 1857,
the largest and most widely circulated papers in Monmouthshire and South Wales
CHIEF OFFICES—NEWPORT, MON.; and at CARDIFF.

The "Evening Telegram" is published daily, the first edition at Three P.M., the
second edition at Five P.M. On Friday, the "Telegram" is combined with the
"South Wales Weekly Gazette," and advertisements ordered for not less than six
consecutive insertions will be inserted at a uniform charge in both papers.
P. O. O. and cheques payable to Henry Russell Evans, 14, Commercial-street,
Newport, Monmouthshire.

**MINING PROSPECTUSES AND ANNOUNCEMENTS OF
PUBLIC COMPANIES** should be inserted in the BARNSTAPLE TIMES,
published every Tuesday, and in the DEVON POST, published every Saturday,
or these papers circulate largely throughout Devon and Cornwall, where many thou-
sands of investors reside. Legal and Public Companies' advertisements, 6d. a line
each insertion; Trade and Auctions, 4d. a line; Wanted, &c., 20 words, 1s.
Published by J. B. JONES, Barnstaple-street, Barnstaple, Devon, to whom all orders
by post or telegraph should be sent.

BRYDON AND DAVIDSON'S ROCK DRILL

SELECTED BY THE BRITISH AND OTHER GOVERNMENTS.

Reduced prices of this Rock Drill (formerly called "Kainotomon"), Nos. 1 and 2, £32 and £34.
SUBJECT TO DISCOUNT.

IMPROVED AIR COMPRESSORS.

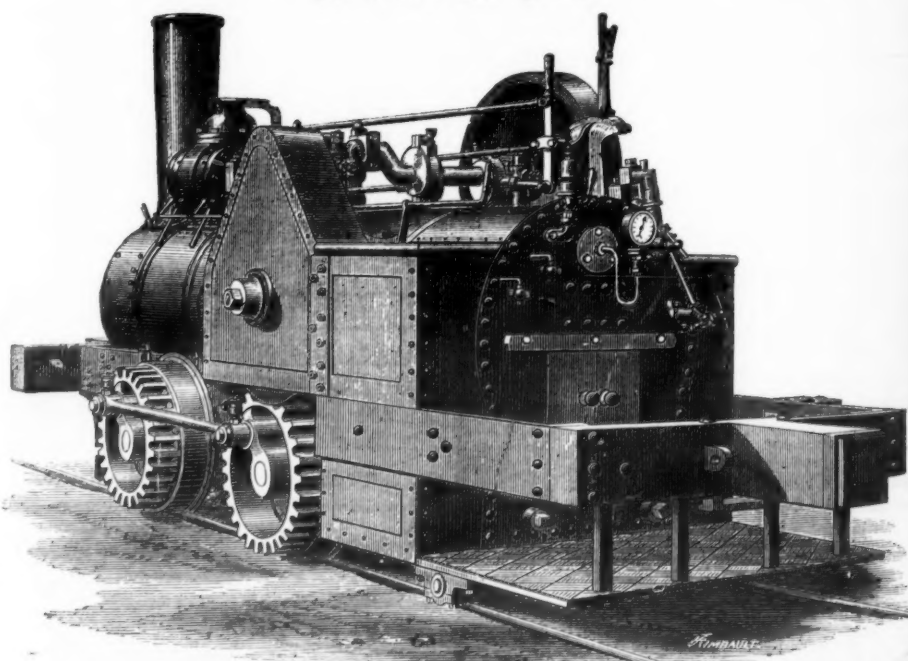
Makers of Pumping and Winding Engines, Steam Hammers,
Boilers, Pump Pipes, &c., &c. Castings of all kinds.

**BRYDON AND DAVIDSON, ENGINEERS,
WHITEHAVEN.**

LEWIN, POOLE, DORSET.

Speciality in cheap colliery and contractors' Locomotives, and
very small Locomotives for replacing Horses.

Prices from £300 upwards.



**PORTABLE FIXED AND VERTICAL ENGINES.
WINDING AND PUMPING GEAR.**

The above represents LEWIN'S STEEL-GEARED LOCOMOTIVE, from a photo of one working on a 22 in. gauge, for replacing horses.

**STREET AND ROAD TRAMWAY LOCOMOTIVES,
ON THE MOST IMPROVED PRINCIPLE.**